3 - Service Software

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Service Software

Phoenix

Phoenix is the new generation Service Software. It has been designed to meet the challenges in servicing modern cellular phone technology.

The Phoenix program has been built using component architecture. This means that the actual program is small and most of the program's functionality is divided into dynamically loaded modules (DLLs).

Supported Operating Systems

Windows 98, 2000, ME and NT 4.0 (SP4).

Hardware requirements for using Phoenix

Minimum:
Processor 233 MHz, RAM memory 64 MB, Disk space 50-100 MB.

Recommended for Windows 2000:
Processor 700 MHz, RAM memory 512 MB, Disk space 50-100 MB.

Introduction

This section briefly describes how to install the Phoenix software and includes some basic information on how to use the program. For more detailed information, please refer to Phoenix's **Help –files**. Each feature in Phoenix has its own Help function, which can be activated while running the program.

Press the *F1* key or the feature's Help-button to activate a Help -file.

Installing Phoenix

1. Download the latest release. Please contact your regional After Market Services point for information on where to download the latest release.

Download and read the release notes, which have useful information on the software version you are using.

2. Download the latest data packages for the products you will be using.

3. Before you start installing the program, check that

- the dongle is attached to parallel port. Contact your supervisor in order to obtain a suitable dongle.
- you have administrator rights (Windows 2000 or NT only). This is required in order to be able to install Phoenix.

4. Install Phoenix by executing the Phoenix installation package and follow the instructions on the screen.

Initially the setup files are extracted into the file system.

Note: If the setup files are already extracted (left in the file system from previous instal-

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lation) "Overwrite Protection" dialog appears. Always click "Yes to All" to overwrite the existing setup files.

5. The installation checks that the latest supported dongle driver version is installed. The dongle driver is installed if there is no previous installation of the dongle driver or if the installed dongle driver is older than the latest supported version.

Note: If the dongle driver is installed during installation, you need to reboot your PC and restart the installation after reboot.

Program files are stored under " C:\Program Files\Nokia\Phoenix" (default).

6. Install the data package by executing the installation package and follow the instructions on the screen.

The data packages will create product specific directories under the installation directory.

Data files are stored under " *C:\Program Files\Nokia\Phoenix*" (default).

Uninstalling Phoenix

If you need to remove Phoenix Service Software from your computer:

1. Make sure that the dongle is attached (unregistration).

2. Go to the Control Panel and select **Add/Remove Programs.**

3. Select Phoenix for uninstallation and click **Add/Remove**.

4. Click **OK** to remove the application

You may have to reboot your PC after uninstallation.

Note: If you have different product packages installed, the components are uninstalled only if they are not included in other product packages.

Data Packages

Data Packages (DP) is a name for a helpful feature in the Phoenix software. This type of feature provides a flexible way of distributing and installing Phoenix and its data files.

All product-specific data is separated from the program code and installed separately. This means that the installation is performed in at least two steps.

Each product will have its own Data Package (DP). The FPS-8 flashing equipment also has its own package.

Starting a session

Concepts

In the Phoenix context, *Product* means the cellular phone attached to a PC. More specifically, it is a particular type of phone.

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Connection means the type of cable used to attach the phone to the port to which the other end of the cable is attached.

Selecting a product

Many of Phoenix's features are product-specific. It is, therefore, mandatory to choose the product you will be working on at the beginning of the session.

Select the menu item *File - Choose Product*. You will be presented with a list of available products.

After the product selection, you will see an additional menu item on the main menu. If you take a look at the available menu items, you will see that their number has increased.

Selecting a connection

The connection defines the cable and the communications port that will be used when connecting to the phone.

1. Active connections are listed in the toolbar's *Connection* pull-down menu. You should make sure that the connection is correct before using the software. Change it, if necessary.

In case the connection is the wrong, you need to create a new one.

2. Select *Settings* from the pull-down menu .

3. Select *Add* in the *Connection List Dialog* and in fill the relevant fields in the *Connection setup* dialog.

Phoenix environment

You can configure the program's main toolbar and the product or tool -specific options to your liking.

You can control which toolbars are visible by selecting **View** and **Toolbars** from the pull-down menu. The visible toolbars are marked with a check.

The rest of the options are product or tool -specific. The tool-specific options are set using the associated toolbar.

Using components

When working with Phoenix, each task generally has its own component that will perform the task. The first thing, therefore, is to open the desired component.

Opening a component means that you open a tool window within Phoenix. When this window is opened, Phoenix also opens a toolbar for it and adds component-specific menu items in the **View** menu.

Using profiles

A Profile is a useful feature in the software. Product, connection and currently open

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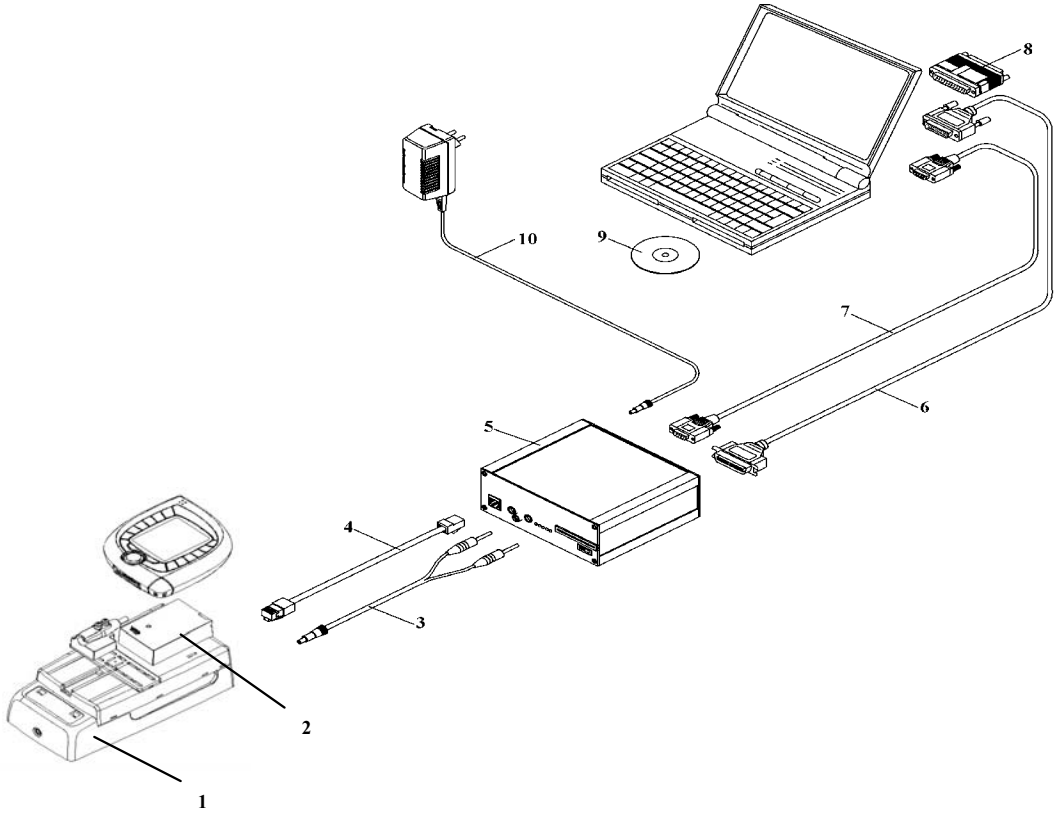
components can be stored into a permanent storage (a disk file called profile, *.nmp) for later retrieval.

Opening and saving profiles is done via menu commands found in the **File** menu. Select *Open Profile* and *Save Profile*.

Since profiles are stored into a disk file with the user-defined name, there can be multiple profiles for different repeated tasks.

SW update flashing setup

FPS-8 Flash setup



The following equipment is required for 7600 (NMM-3) AMS SW update, when connecting NMM-3 to PC with FPS-8:

Item	Description	Type	Code
1	Docking station	JBV-1	0770298
2	Docking station adapter	MJF-29 (used with JBV-1)	0770592
3	DC Power cable	PCS-1	0730012
4	Modular cable	XCS-4	0730178
5	Flash prommer box sales pack	FPS-8	0080321
6	Printer cable	~ (supplied with FPS-8)	0730029
7	RS232 (D9 – D9) cable	AXS-4 , incl in FPS-8 sales pack	0730090
8	Software protection key (Dongle)	PKD-1	0750018
	Service SW (downloadable from PWS)		xxxxxxxx
10	AC Charger,	ACF-8, incl in FPS-8 sales pack	0680032

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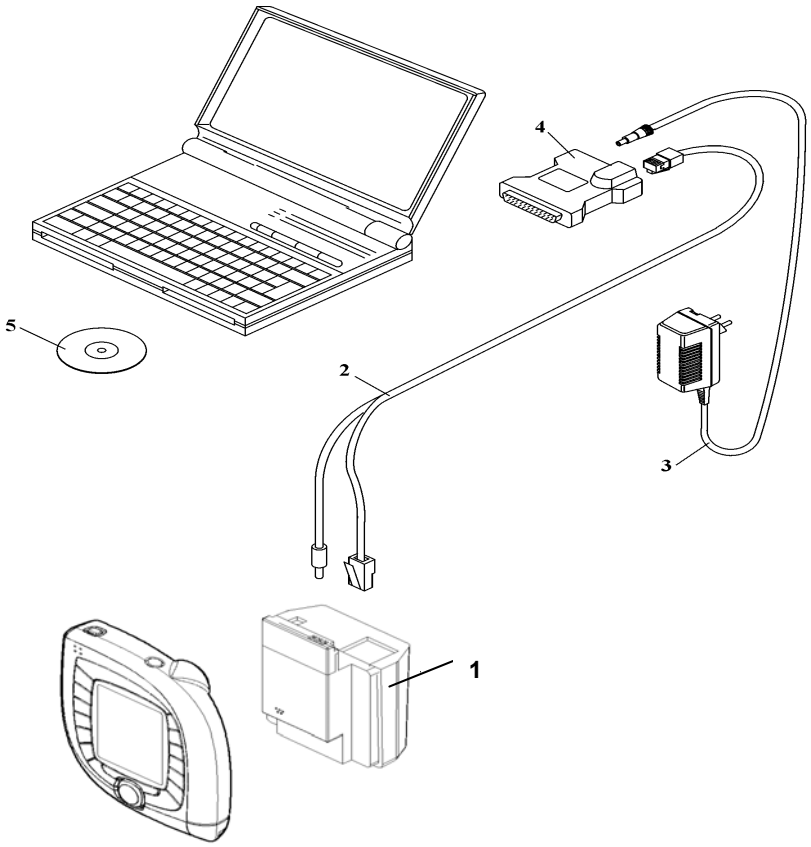
Note: When flashing the NMM-3 there must be two additional SRAM cards (SF12: code 00803346) assembled inside the FPS-8

POS Flash concept



The following equipment is required for 7600 (NMM-3) AMS SW update, at point of sale when connecting NMM-3 to PC with FLS-4:

Item	Description	Type	Code
1	Point of Sales flash loading adapter	FLA-45	0775340
2	Service cable	XCS-1	0730218
3	AC Charger,	ACF-8, incl in FPS-4S sales pack	0680032
4	FLS-4S sates pack for E & A	FLS-4S	0080541
4	FLS-4S sates pack for APAC	FLS-4S	0080542
5	Service SW (downloadable from PWS)		xxxxxxxx

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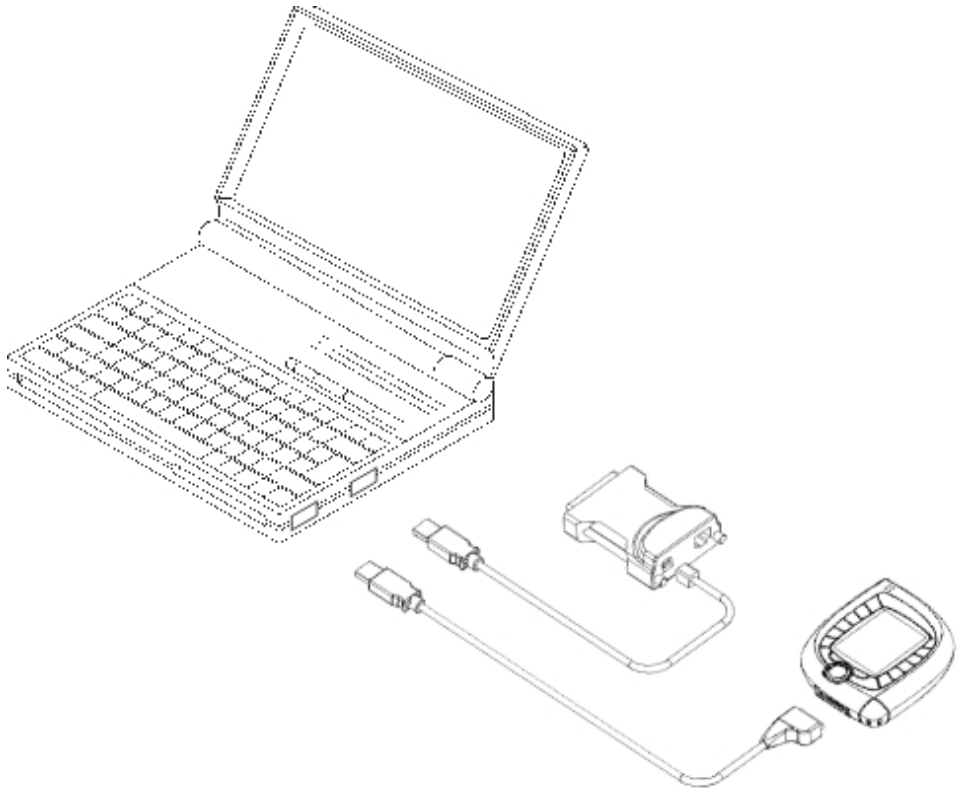
USB Flash concept 1



- Concept 1 (PC must have 2-USB ports) assuming that the laptop parallel port is used for other purpose.
- The FLS-4S is connected to the Laptop USB port via USB cable as shown above.
- Phone to PC via DKU-2

The following equipment is required for 7600 (NMM-3) USB Flash concept 1 set-up:

Item	Description	Type	Code
1	Pop port cable	DKU-2	0273643
2	USB type B cable	~	xxxxxxxx
3	FLS-4S sates pack for E & A	FLS-4S	0080541
3	FLS-4S sates pack for APAC	FLS-4S	0080542

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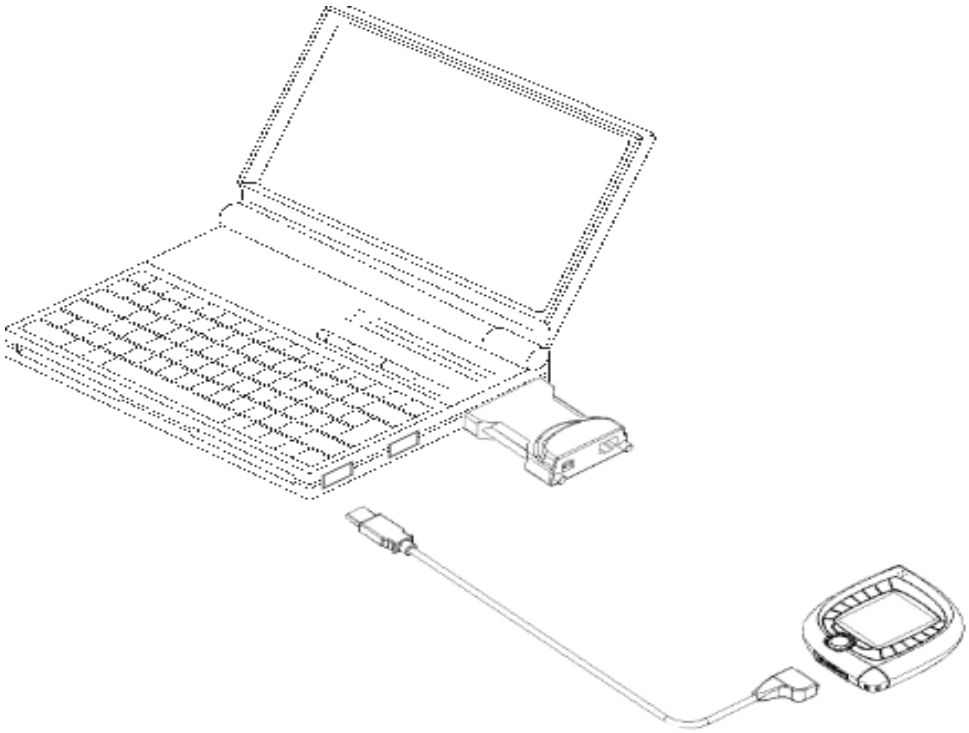
USB Flash concept 2



The following equipment is required for 7600 (NMM-3) USB Flash concept 2 set-up:

Item	Description	Type	Code
1	Pop port cable	DKU-2	0273643
2	FLS-4S sates pack for E & A	FLS-4S	0080541
2	FLS-4S sates pack for APAC	FLS-4S	0080542

NMM-3 Phoenix installation instructions

Now that cables have been connected, you must install NMM-3 version of Phoenix to your PC.

- Save the package to your hard disk and install it by doubleclicking it.

NOTE: It is recommended that you uninstall previous Phoenix package before installing the new one. Do it as follows:

- Click Start -> Settings -> Control Panel
- Add/Remove Prog.
- Phoenix NMM-3 release
- Add/Remove

Reboot your computer after uninstallation

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FPS-8 to PC connection Setup instructions

Establish connection between your PC and FPS-8. The procedure is as follows:

- Start phoenix
- Choose **File** -> **Manage connections**
- Choose **Add**
- Select mode, select **Manual**
- As Media, select **FPS-8**
- Port number, select the port where you have connected the serial cable of FPS-8.
- Select 115200 BIT_RATE
- COMBOX_DEF_MEDIA, select **FBUS**
- Click on **Finish**
- Press **Arrow up** key so that FPS8 COM1 FBUS becomes the first on the list.
- Press **Apply** and close the window

The connection between PC and FPS-8 has now been configured.

FPS-8 activation

Follow the instructions inside FPS-8 sales pack to get FPS-8 activated.

Checking Application SW version inside FPS-8

When you have connection established to FPS-8 and FPS-8 has been activated, the first thing to do is to check that you have correct application SW version inside FPS-8. Phoenix SW can check that automatically. The procedure goes as follows:

Go to the partner web site and take newest AMS FPS-8 SW.

Instructions:

- Click Fps-8 downloads
- Click **Flash Update**
- Click **AMS/Production version**
- Click 2.10.000
- Take file **flash_update_02_10_000.exe**
- Save it to your hard drive to a place which you can remember
- Go to that directory and click on **flash_update_02_10_000.exe**

You will see the following note on your screen. Install files to the directory which installation program suggests to you.

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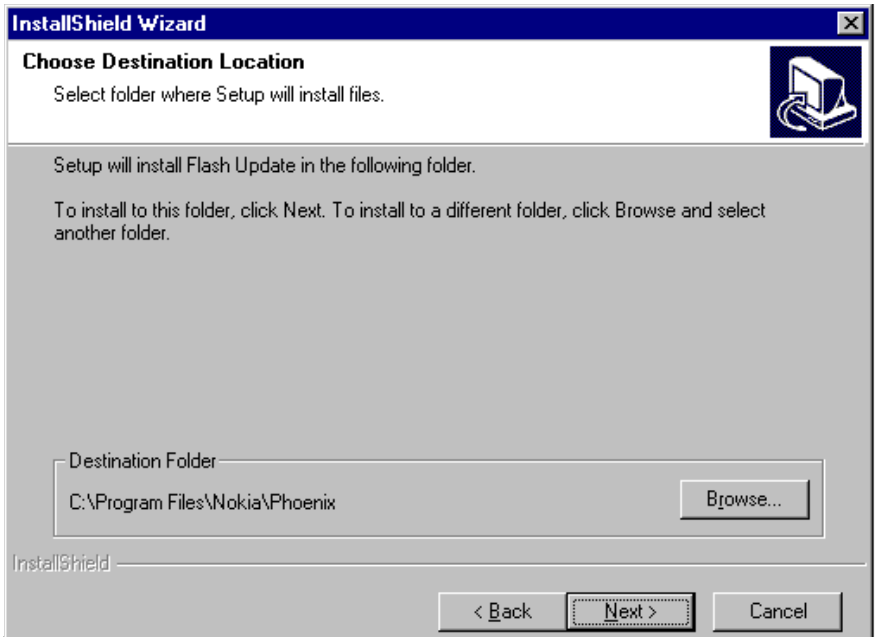
Figure 1: Install Shield Wizard screen


InstallShield Wizard
Choose Destination Location
Select folder where Setup will install files.
Setup will install Flash Update in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files\Nokia\Phoenix
Browse...
InstallShield
< Back
Next >
Cancel

When the installation has been finished, FPS-8 files are located in that directory.

You can now start phoenix SW.

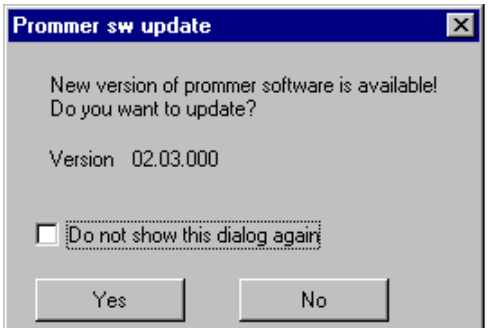
When phoenix SW has stared, do the following:

Click on **flashing**

Click on **FPS-8/FPS-8C Maintenance**

If SW inside FPS-8 prommer is too old, you get the following notification:

Figure 2: Prommer SW update screen



Click **Yes** and you see on the small scree as the Prommer goes to service mode (mode2 is lit) SW goes into box, application SW , Secondary boot codes and algorithm codes are updated.

There is no longer need to do anything special with NMM-3 specific Secondart boot codes and algorithm codes.

Your PC and FPS-8 is now ready for NMM-3 SW update.

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Reprogramming NMM-3

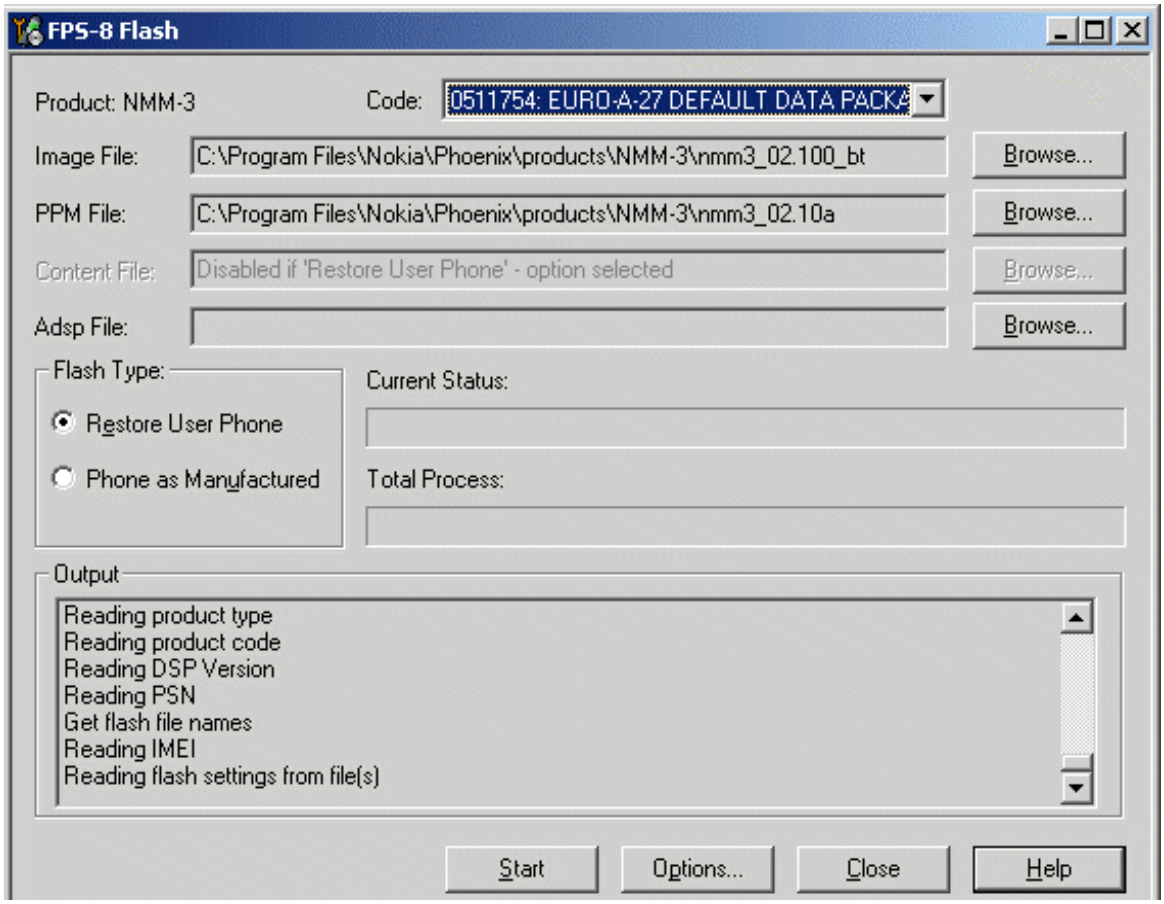
For programming using the FPS-8, remove SIM and attach the FLA-45 adapter or connect to MJF-29/JBV-1 as shown in the FPS-8 Flash setup above. If flashing using the FLS-4S via USB, power on phone as normal, with SIM fitted and connect DKU-2 Pop port cable in either of the two USB flash configurations shown above.

Updating Software

The following procedure can be used for updating the phone software.

- Open Phoenix
- Choose **File - Manage connections**
- Set the required connection method to the top of the priority list and **Apply**
- Select **Flashing** and choose either: **FPS-8 Flash** or **FLS-4 Flash** depending on connection method

The Flash window will open.



To restore the user data after the phone has been flashed select **Restore User Phone**. If you wish to delete all the user data and return the phone to manufactured state, select **Phone as Manufactured**.

- Select the required **Image File** and **PPM File** using **Browse...** buttons on the Flash File Selection window. If **Phone as Manufactured** has been selected, enter the **Content File** path.

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- Do not select an **ADSP File**.
- Select **Start** to begin flashing.
- Follow instructions on screen as required.

If flashing is done by the FPS-8 then the software package is first transferred to the FPS-8, this process may be slow, in which case, it is recommended that the parallel port is configured in ECP mode. If you do not know how to change the parallel port mode contact your local support.

If flashing is done using the FLS-4S with USB then the ADL package is first down loaded, this is a phone application that manages the USB flashing process.

Erasing of the phone memory is then carried out.

Finally the software package is programmed into the phone, and the user data, if requested, is restored.

Service Tool Concepts for Calibration

Calibration can be carried out using:

- MJS-84 Module Jig
- JBV-1 Docking station with MJF-29 Docking Station Adapter for NMM-3

Power to the MJS-84 or JBV-1 should be supplied from an external DC power supply, not the FPS-8 prommer.

Remember cable attenuation when tuning RF power settings.

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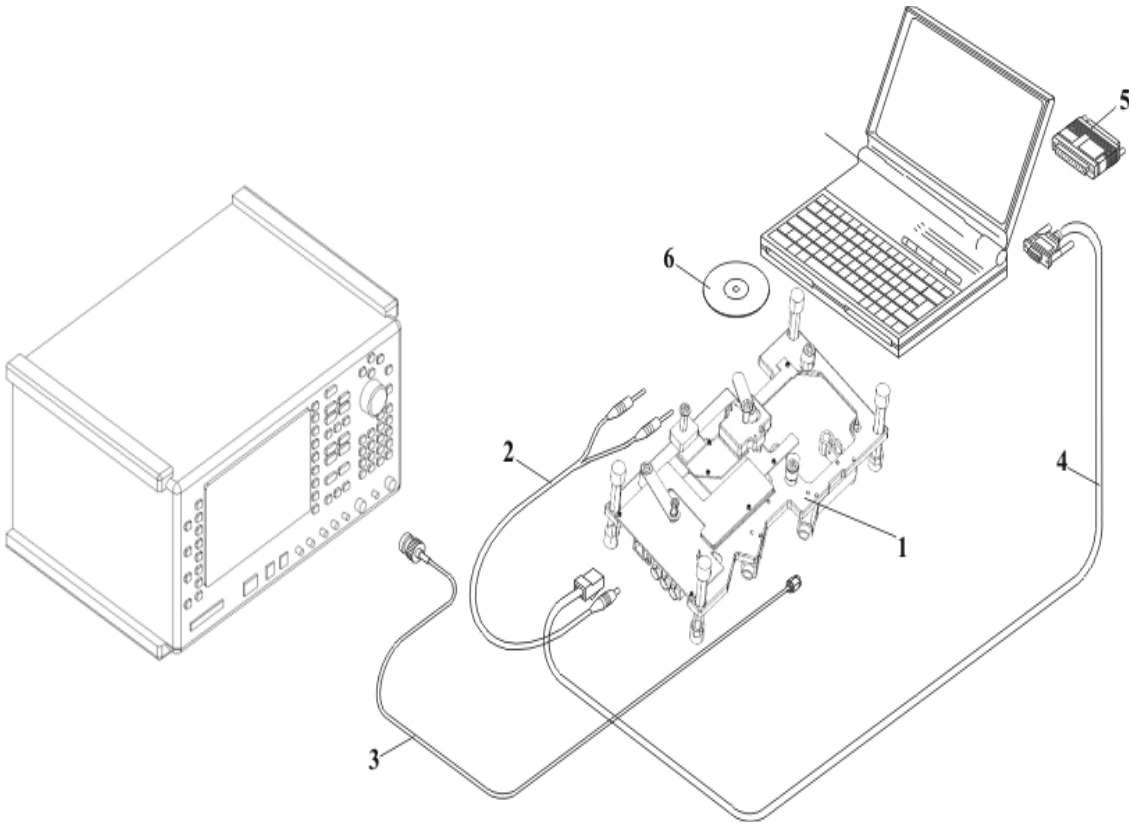
Calibration Set-up using MJS-84



Number	Type	Description	Code
1	MJS-84	Module jig	0770590
2	PCS-1	DC power cable	0730012
3	XRF-1	RF antenna cable	0730085
4	DAU-9S	Service MBUS cable	0730108
5	PKD-1	Software protection key (Dongle)	0750018

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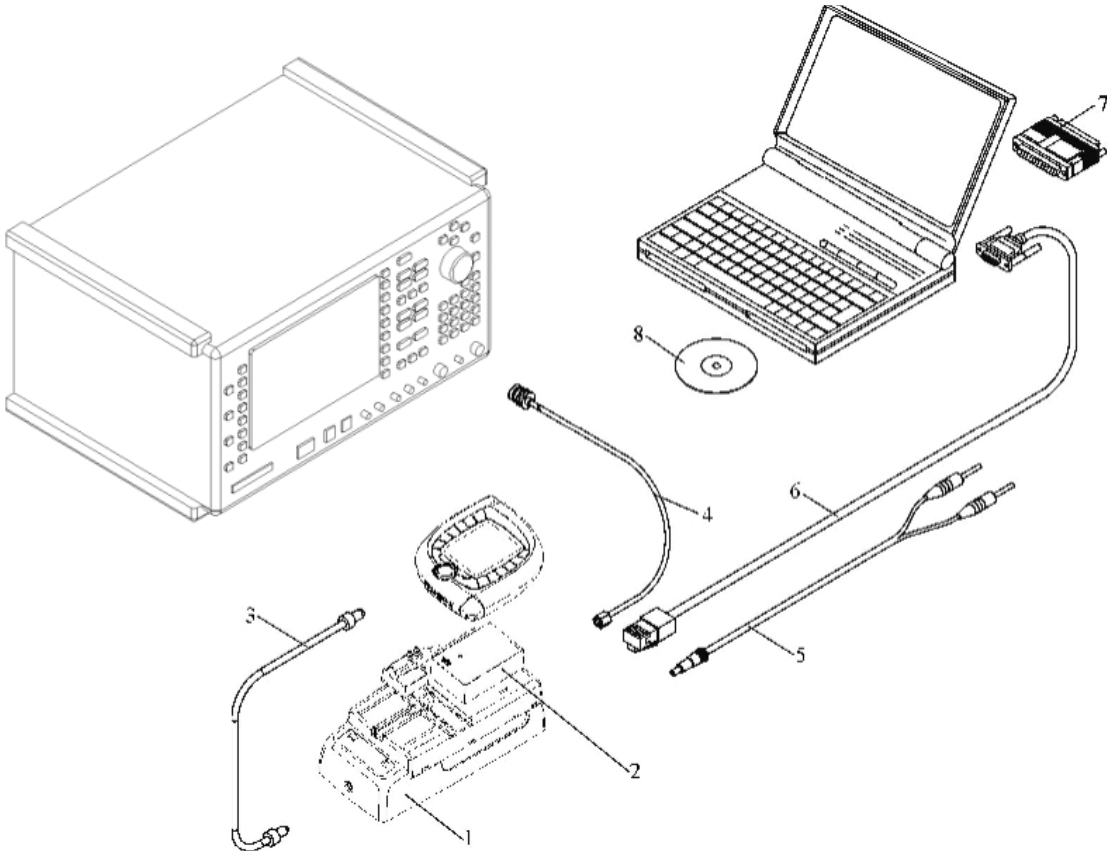
Calibration Set-up using JBV-1



Number	Type	Description	Code
1	JBV-1	Docking station	0770298
2	MJF-29	Docking station adapter	0770592
3	SCB-3	DC-DC cable	0730114
4	XRF-1	Antenna cable	0730085
5	PCS-1	DC power cable	0730012
6	DAU-9S	Service MBUS cable	0730108
7	PKD-1	Software protection key (Dongle)	0750018
8		Phoenix Service SW	

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Energy Management Calibration

Energy management calibration should be carried out after any of the following:

- Replacement of UEME
- Replacement of ZOCUS (IBAT only)
- Replacement of Flash 0 (D450)

Automatic Calibration

It is recommended that Energy Management calibration is done automatically using the JBV-1 as follows:

Connections

The NMM-3 phone must be connected to JBV-1 (Docking station) with MJF-29 (Docking station adapter).

- Connect CA-5S (DC-DC cable) from JBV-1 into to phone charger connector before powering up JBV-1.
- Power up JBV-1 from external power supply: 11-16 V DC. (Do not take power from FPS-8 in calibration mode).

Phoenix Setup

- Start Phoenix
- Select **File - Manage connections - FBUS** and apply
- Select **File - Scan Product**
- Select **Maintenance -> Tuning -> Energy Management**

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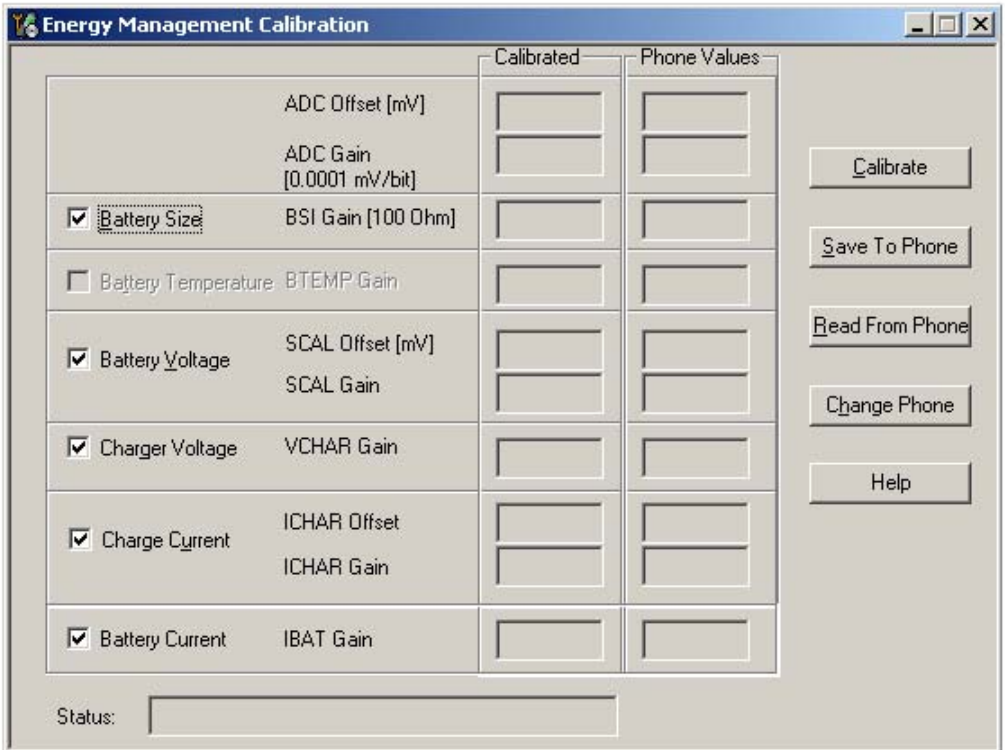
Calibration

Figure 3: Energy Management Calibration screen



- Press the **Calibrate** button
- After calibration is complete, the calculated values are shown in the Calculated column. Select the **Write to PM** button to store values to phone.
- The **Read from PM** button can be used to confirm that the values have been written to the phone or to compare calculated values with current phone values.

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Limits For Energy Management Calibration

Measurement Reference		Low Limit	High Limit
ADC	Offset	-50	50
	Gain	26500	28500
Battery Size	Gain	900	1200
Battery Voltage	Offset	2400	2600
	Gain	10000	11000
Charger Voltage	Gain	57500	62500
Charger Current	Offset	-200	200
	Gain	4100	6000
Battery Current	Gain	1	255

GSM Tuning

General remarks on GSM RF Tuning

- RF tunings must be made in the same order as shown in this document. The order of the menu items in the Phoenix service software may be different.
- If baseband tunings are needed, they should be made before the RF tunings.
- After tuning is completed the mode must be set manually to dual mode. This must be done to ensure that the phone is not registering only to WCDMA mode!
- Avoid unnecessary tuning - factory tuning values are always the most accurate ones.
- Views in this document may change as the service software is developed. Please refer to the Phoenix help files. phone model specific service manual and bulletins for help.

Introduction

The following outlines the test method for the alignment of the NMM-3 GSM transceiver using Phoenix.

Receiver tunings

RX Channel Select Filter Calibration

- Extra equipment / external RF signal not needed
- Must be done before other RX calibrations
- This function is used to calibrate RX channel select filter in GSM Phones.
- Rx Channel select filter is tuned only in one band = Single calibration for both bands

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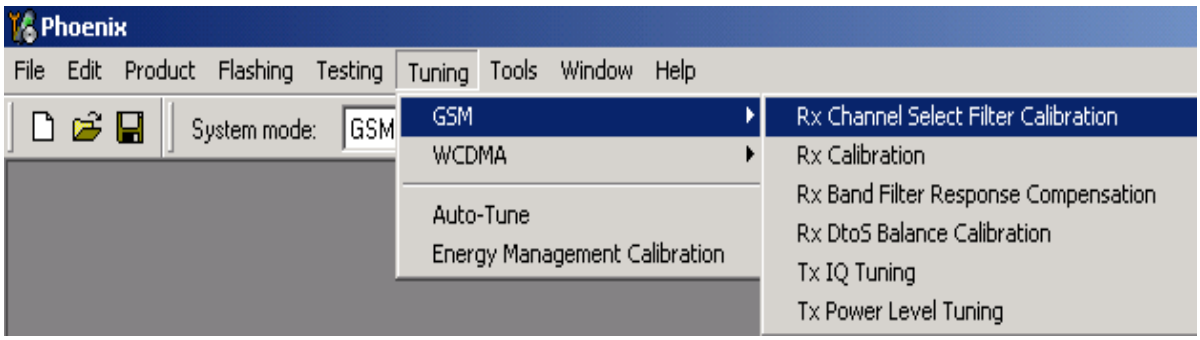
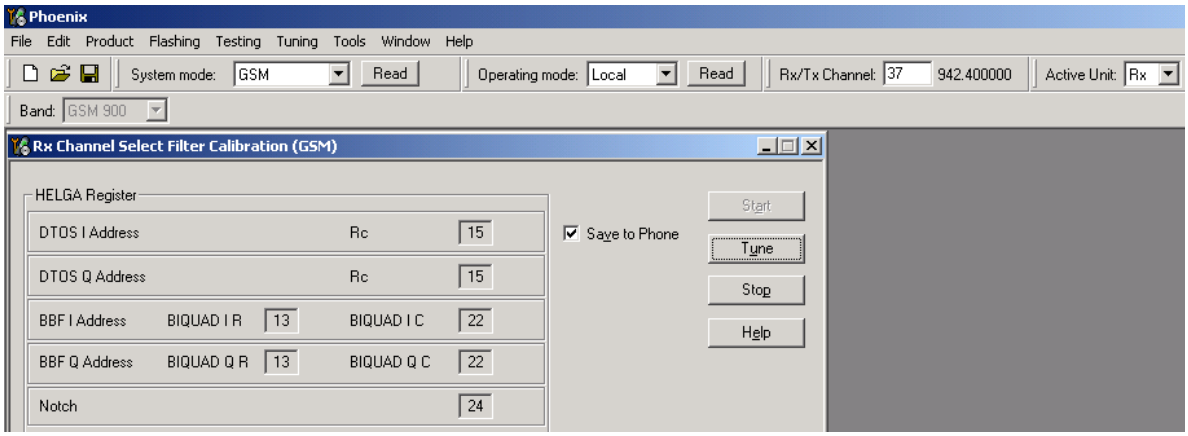


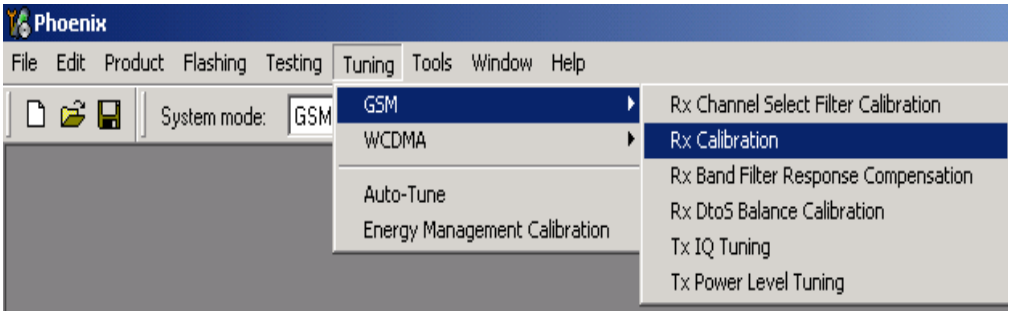
- Select > Tuning >GSM> Rx Channel select filter calibration


Phoenix
File Edit Product Flashing Testing Tuning Tools Window Help
System mode: GSM Read
Operating mode: Local Read
Rx/Tx Channel: 37 942.400000
Active Unit: Rx
Band: GSM 900
Rx Channel Select Filter Calibration (GSM)
HELGA Register
DTOS I Address Rc 15
DTOS Q Address Rc 15
BBF I Address BIQUAD I R 13 BIQUAD I C 22
BBF Q Address BIQUAD Q R 13 BIQUAD Q C 22
Notch 24
Save to Phone
Start
Tune
Stop
Help

- Press “Tune” to start the tuning
- Press “stop “ to end the tuning, results will automatically be saved to phone memory.

RX Calibration

- RF generator needed
- This tuning performs RX Calibration
- Must be done separately on both bands!
- Start RX Calibration at EGSM (GSM900), then do RX Calibration at GSM1800 band.
- AFC tuning is done while EGSM (GSM900) band RX Calibration is performed.
- Remember to take jig and cable attenuations into account!



- Select >Tuning >GSM > Rx calibratio

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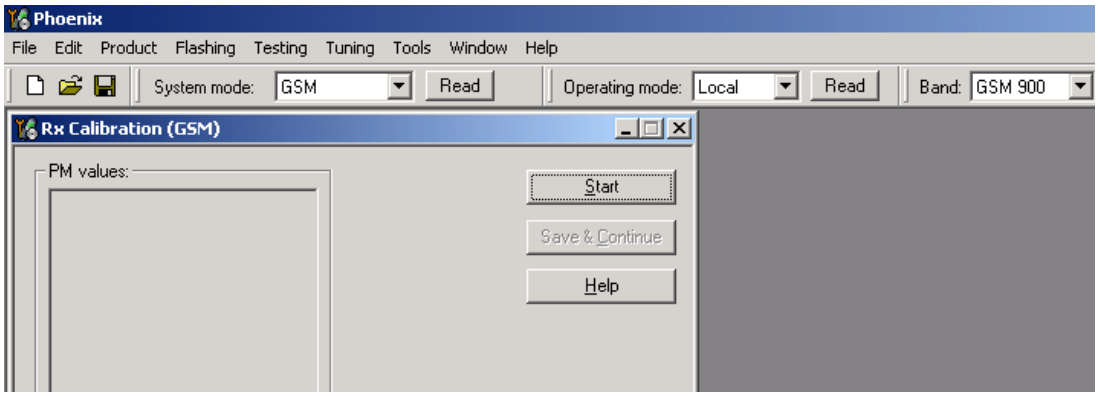
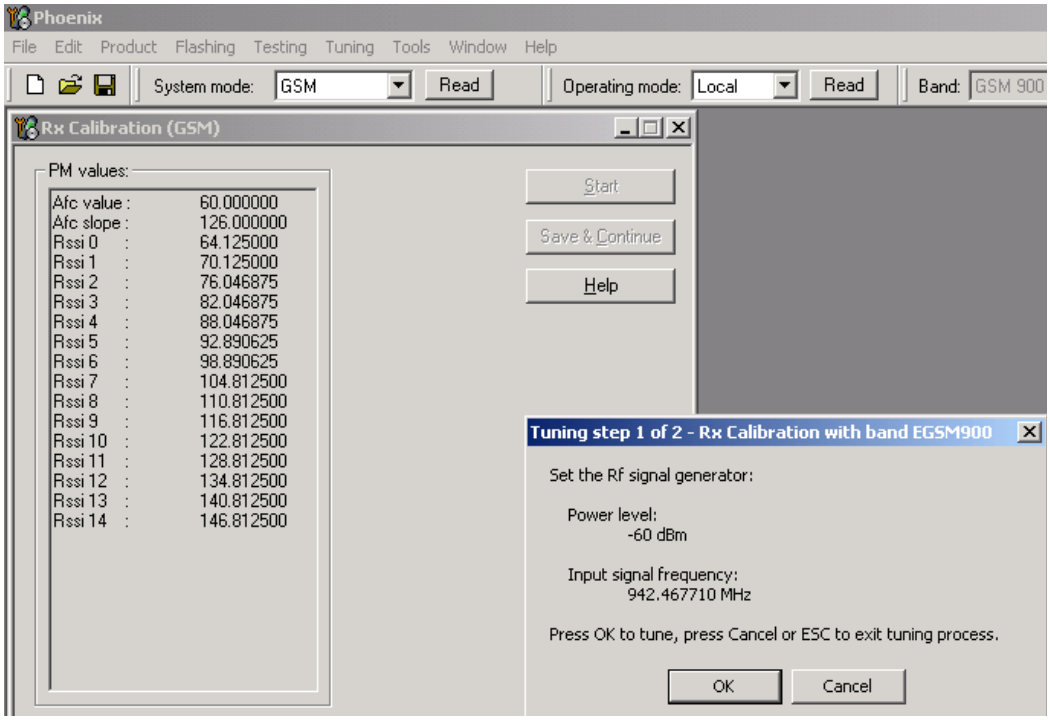


- Press "start"



- Set RF generator to required frequency > OK

Tuning values and ADC readings will be shown

Typical values and limits in (GSM900/GSM1800) RX Calibration:

Name	GSM900			GSM 1800		
	Typ.	LL	UL	Typ.	LL	UL
AFCvalue	100	-350	350	-	-	-
AFC slope	270	150	350	-	-	-
RSSI 0	65	58	68	62	58	68
RSSI 1	71	64	74	68	64	74
RSSI 2	77	70	80	74	70	80
RSSI 3	83	76	86	80	76	86

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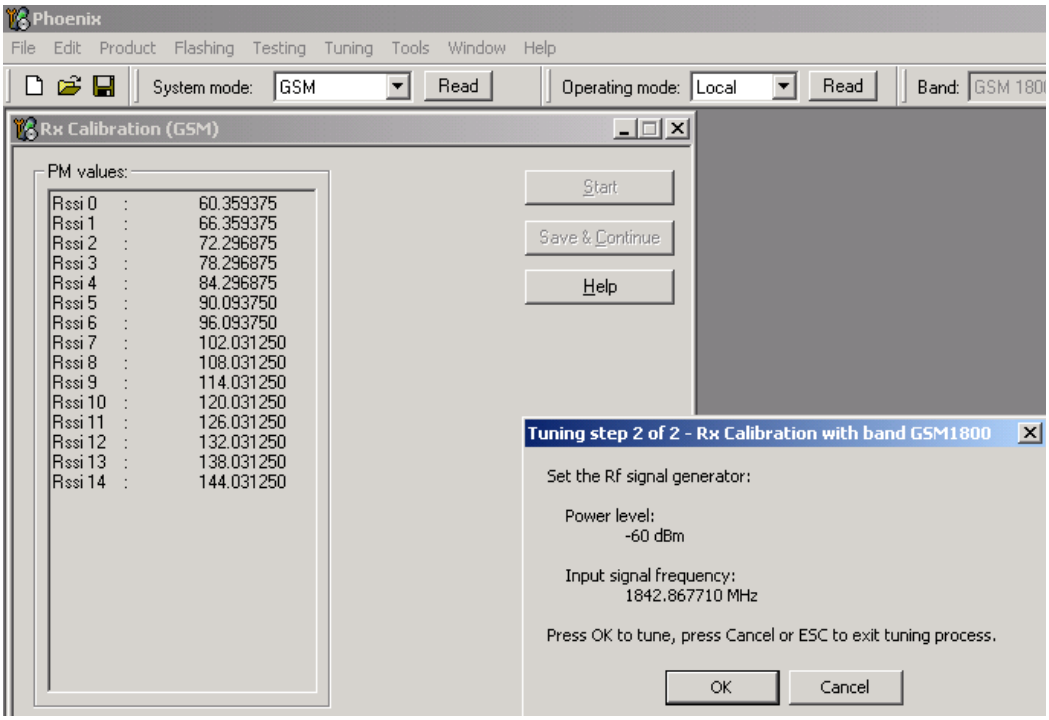
Name	GSM900			GSM 1800		
	Typ.	LL	UL	Typ.	LL	UL
RSSI 4	89	82	92	86	82	92
RSSI 5	94	88	98	92	88	98
RSSI 6	100	94	104	98	94	104
RSSI 7	105	100	110	104	100	110
RSSI 8	111	106	116	110	106	116
RSSI 9	117	112	122	116	112	122
RSSI 10	123	118	128	122	118	128
RSSI 11	130	124	134	128	124	134
RSSI 12	136	130	140	134	130	140
RSSI 13	142	136	146	140	136	146
RSSI 14	147	142	152	146	142	152

- If values shown are within limits, choose "Save and Continue" to save values to the phone
- Continue tuning from GSM1800.



- When asked, set RF generator to required frequency > OK

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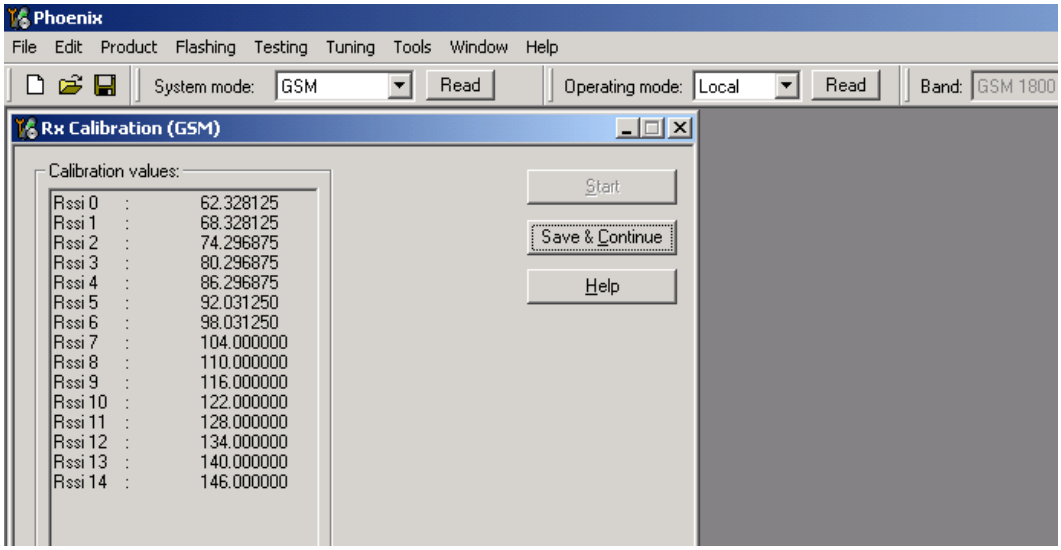


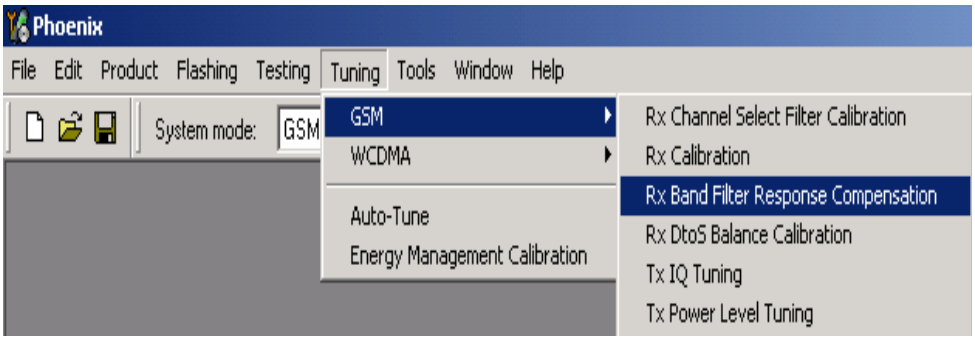
- If values shown are within limits, choose "Save & Continue" to save values to the phone
- Close the "RX Calibration" window to end tuning

RX Band Filter Response Compensation

- RF generator needed
- Must be done separately on both bands!
- Start RX Band Filter Response Compensation at EGSM (GSM900), then do RX Band Filter Response Compensation at GSM1800 band.

  Note: Remember to do RX calibration before doing Rx Band Filter Response Compensation!

- Remember to take jig and cable attenuations into account!



- Select Tuning>GSM> Rx band filter response compensation

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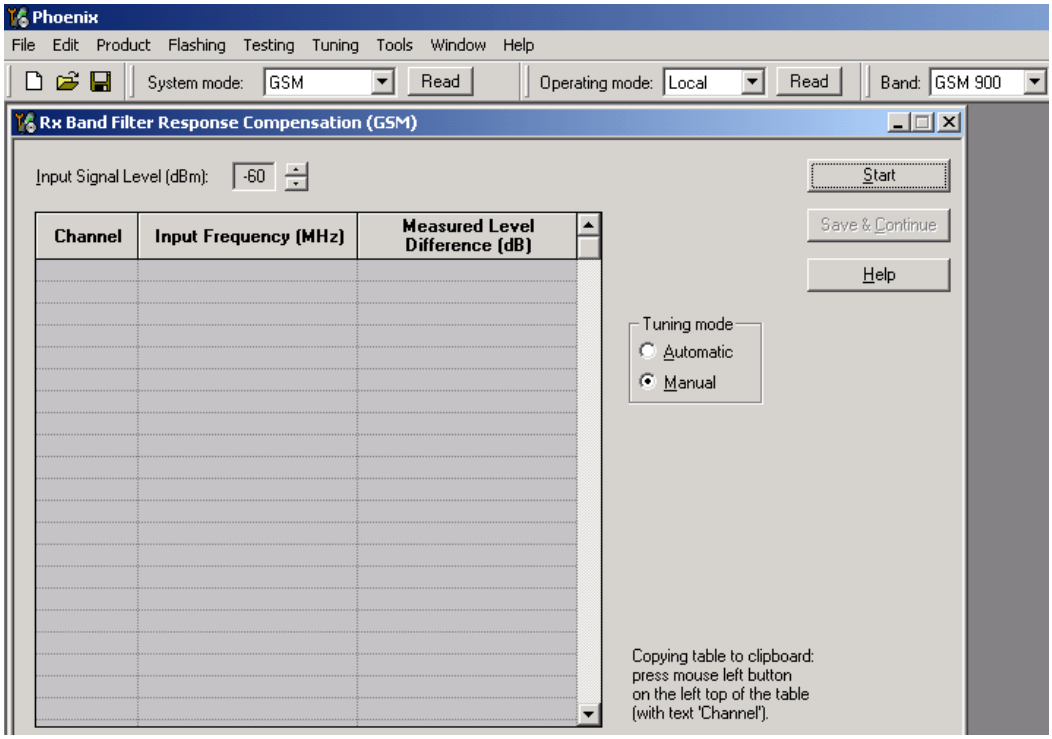
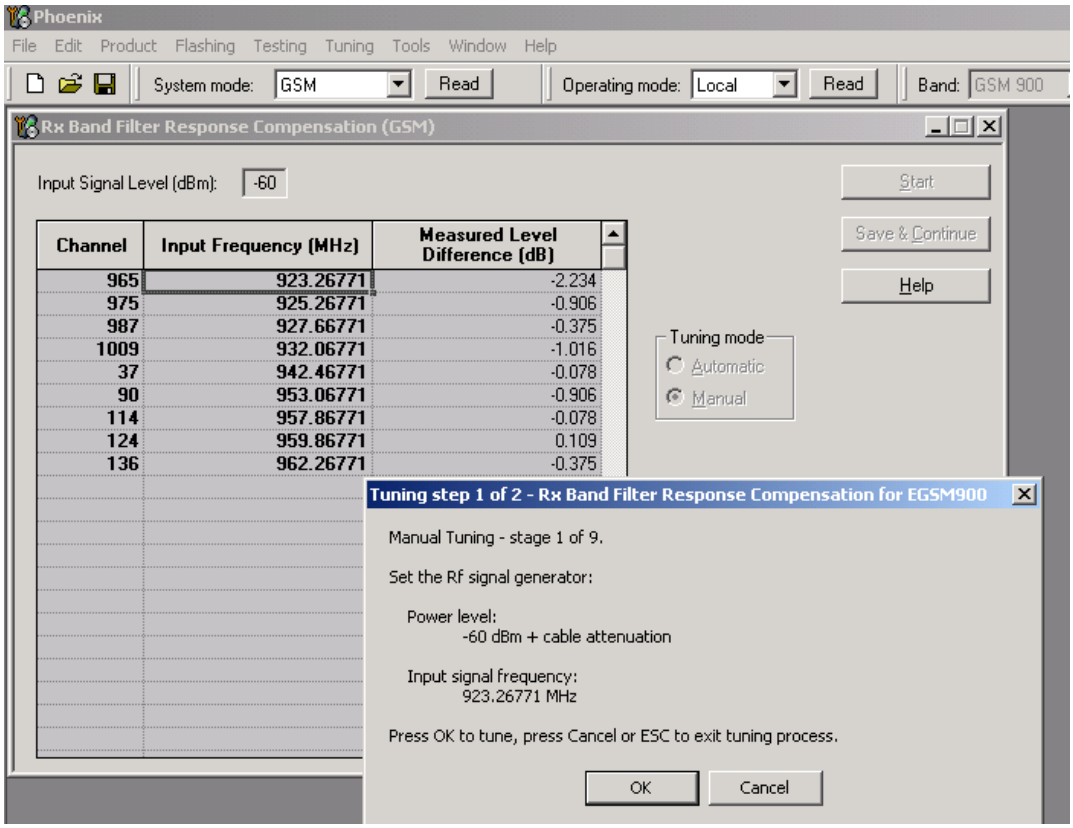


- Select “Manual Tuning”
- Select “start” to start tuning with values already saved to the phone



- You will be asked to supply 9 different RF frequencies to the phone

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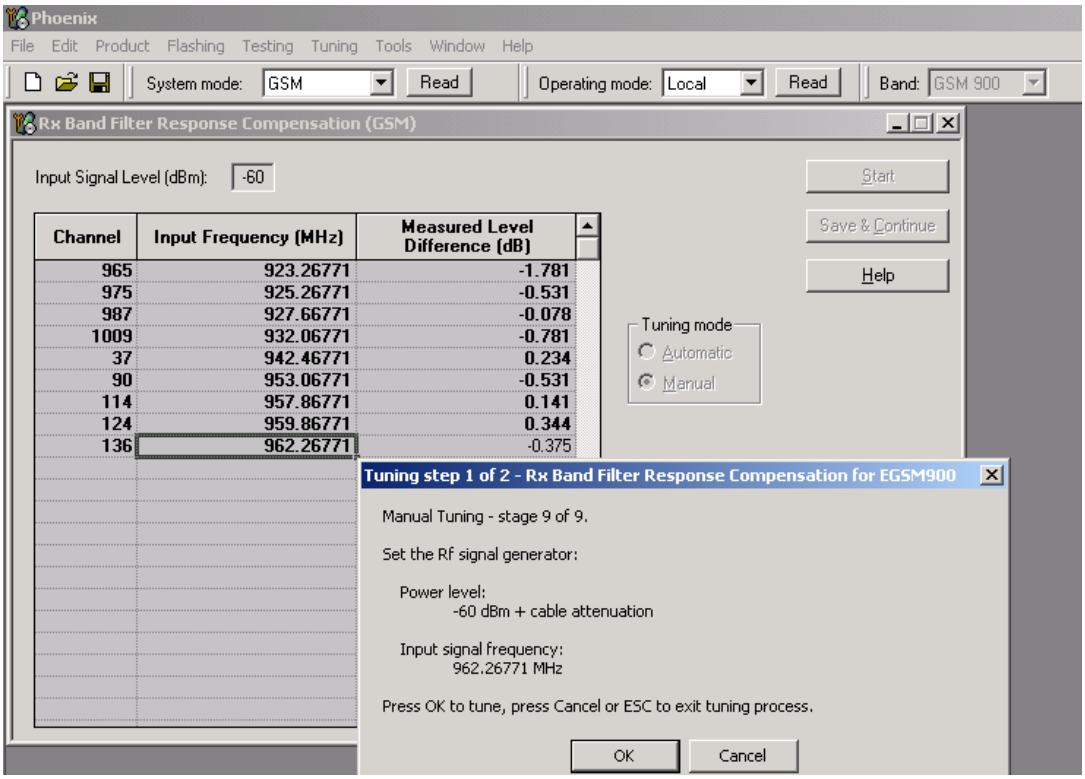
- Select "OK" for every step/frequency



- Repeat the same steps as above for all 9 different frequencies

Typical values and limits in Rx Band Filter Response Compensation EGSM900:

Channel Limits	Input frequency (MHz)	Measured level difference (dB)	Lower Limit (dB)	Upper Limit (dB)
965	923.26771	-0.672	-10	+5
975	925.26771	0.109	-5	+5
987	927.66771	0.750	-5	+5
1009	932.06771	0.109	-5	+5
37	942.46771	1.047	-5	+5
90	953.06771	0.109	-5	+5
114	957.86771	0.859	-5	+5
124	959.86771	0.953	-5	+5
136	962.26771	0.328	-10	+5

- If values are within limits select "Save & Continue" to save values to phone memory

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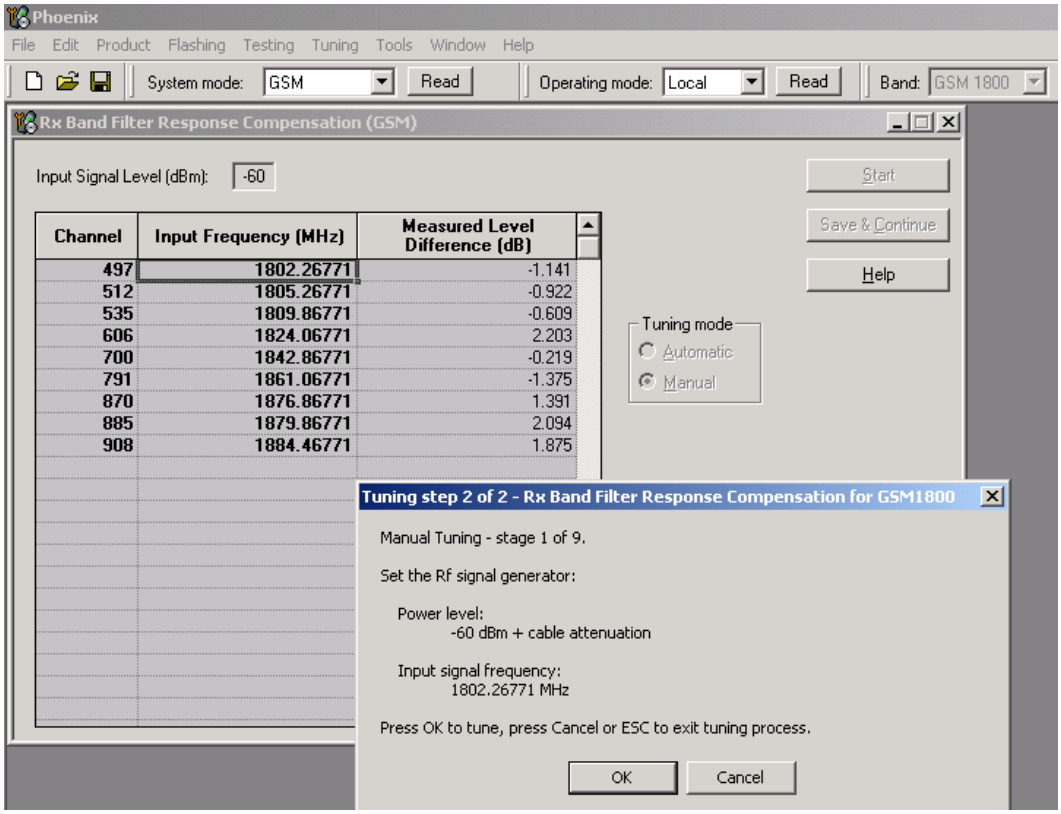

- Continue tuning from GSM1800.
- Repeat the same steps as for the EGSM900 band above

Typical values and limits in Rx Band Filter Response Compensation GSM1800:

Channel Limits	Input frequency (MHz)	Measured level difference (dB)	Lower Limit (dB)	Upper Limit (dB)
497	1802.26771	-0.125	-10	+5
512	1805.26771	-0.500	-5	+5
535	1809.86771	-0.813	-5	+5
606	1824.06771	0.547	-5	+5
700	1842.86771	0.844	-5	+5
791	1861.06771	-1.031	-5	+5
870	1876.86771	0.047	-5	+5
885	1879.86771	0.391	-5	+5
908	1884.46771	0.703	-10	5

- If values shown are within limits, select "OK" to save values to the phone
- Close the "RX Band Filter Response Compensation" – dialog to end tuning

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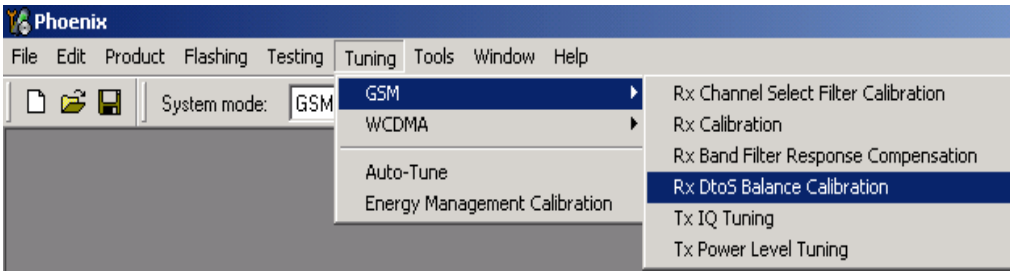
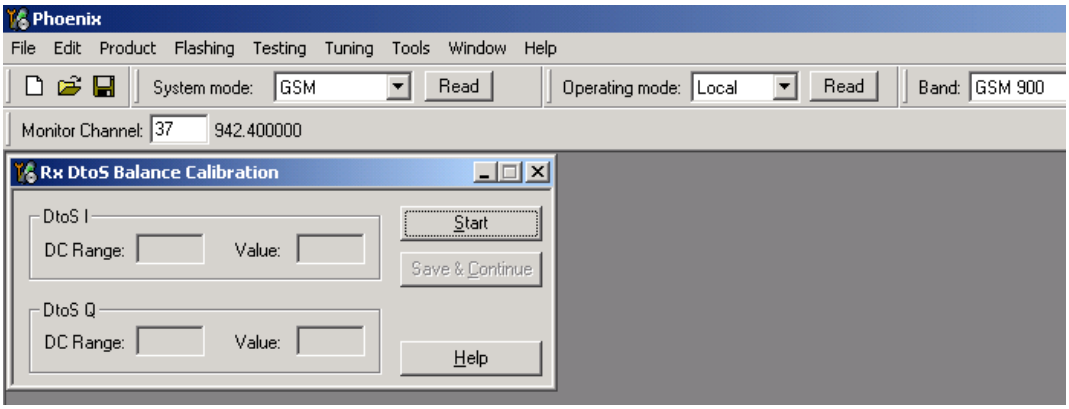
Rx DtoS Balance Calibration

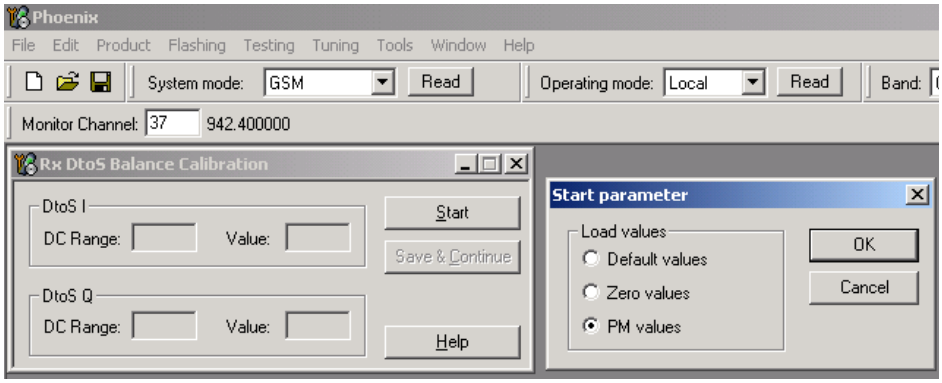
- External RF Signal not Required
- Must be done on both bands
- Function is to calibrate DSP Software DtoS I-Q-channel control word values



- Select >Tuning>GSM>Rx DtoS Balance Calibration



- Select "Start"



- Select "PM Values" to start tuning with values already saved to the phone

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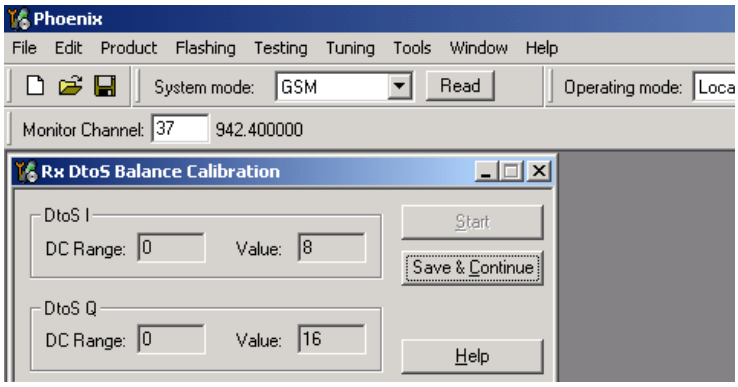
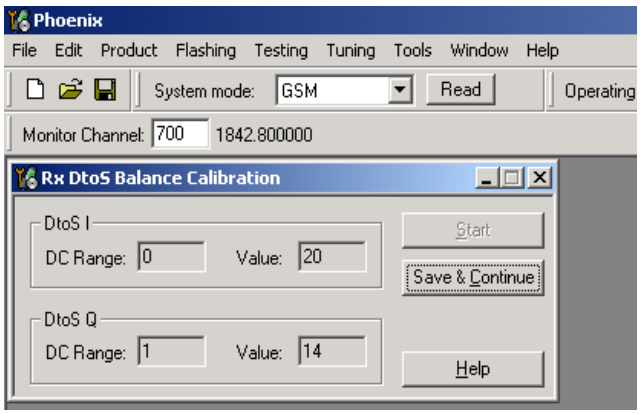


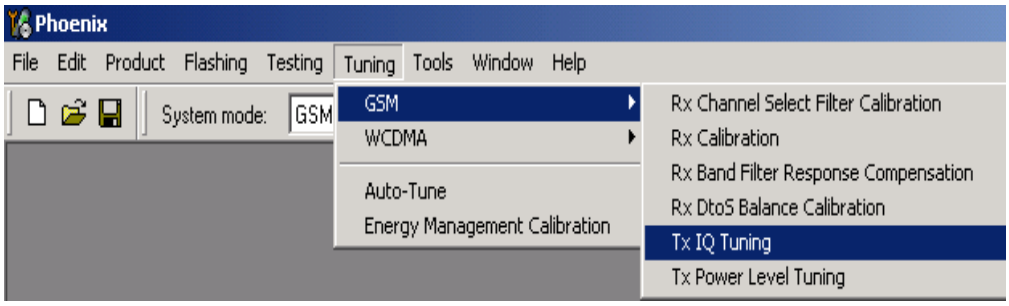
- Select "Save & Continue" to start the tuning
- Continue Tuning for GSM1800 Select "Save & Continue" to start the tuning
- Typical values for GSM1800 are shown below



Transmitter Tunings

TX I/Q Tuning

- Spectrum analyser needed. Use 10dB external pad
- Tx IQ Tuning allows changing the Tx I DC Offset, Tx Q DC Offset, Amplitude difference and Phase difference
- Must be done separately on both bands!
- Start TX I/Q Tuning at EGSM (GSM900), then continue at GSM1800 band.
- Remember to take jig and cable attenuations into account!



- Select >Tuning >GSM>Tx IQTuning

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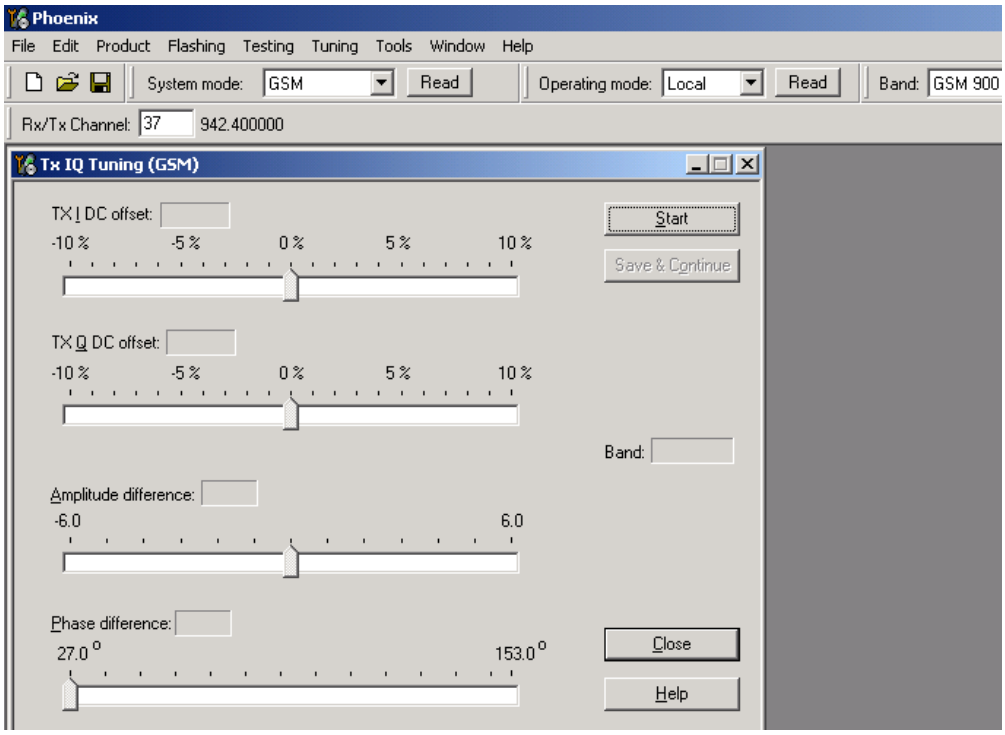
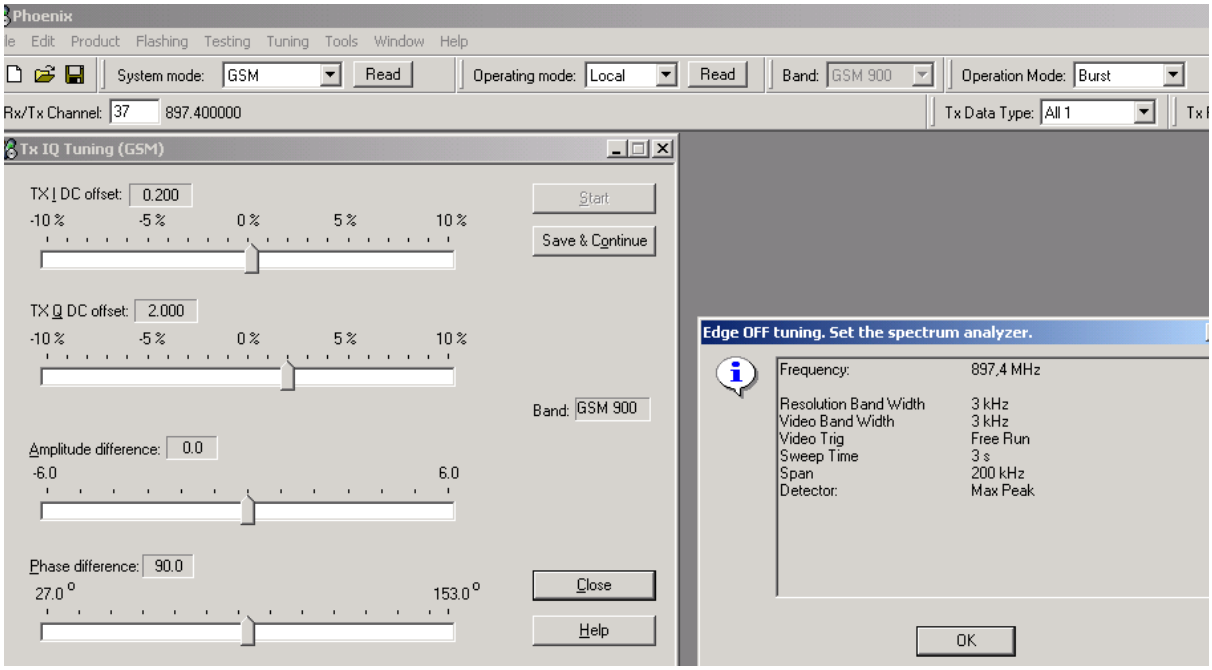


- Select " Start"
- The tuning is done by setting each of the sliders to desired value. The sliders can be changed only when the tuning is ongoing
- The order of tuning should be same as the order of the sliders e.g. the Tx I DC Offset is tuned first and Phase difference is tuned last
- Use PgUp or PgDn keys, arrow keys can be used for fine tuning



- Set spectrum analyser to the settings on the screen

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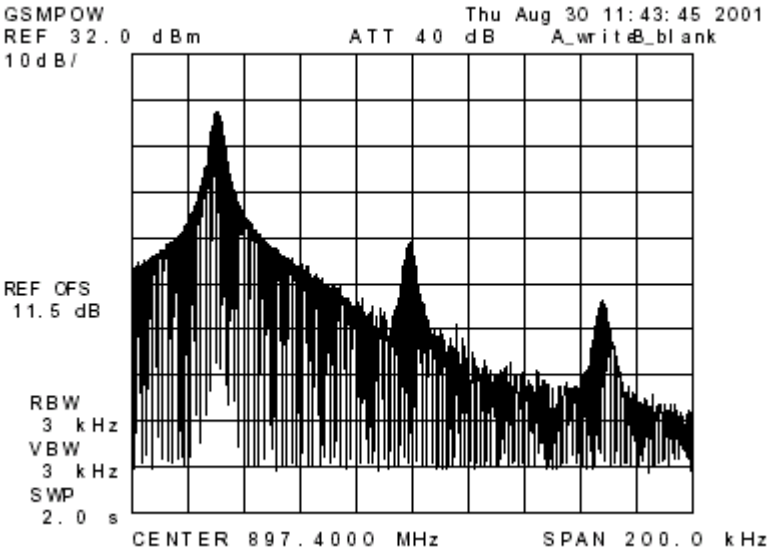
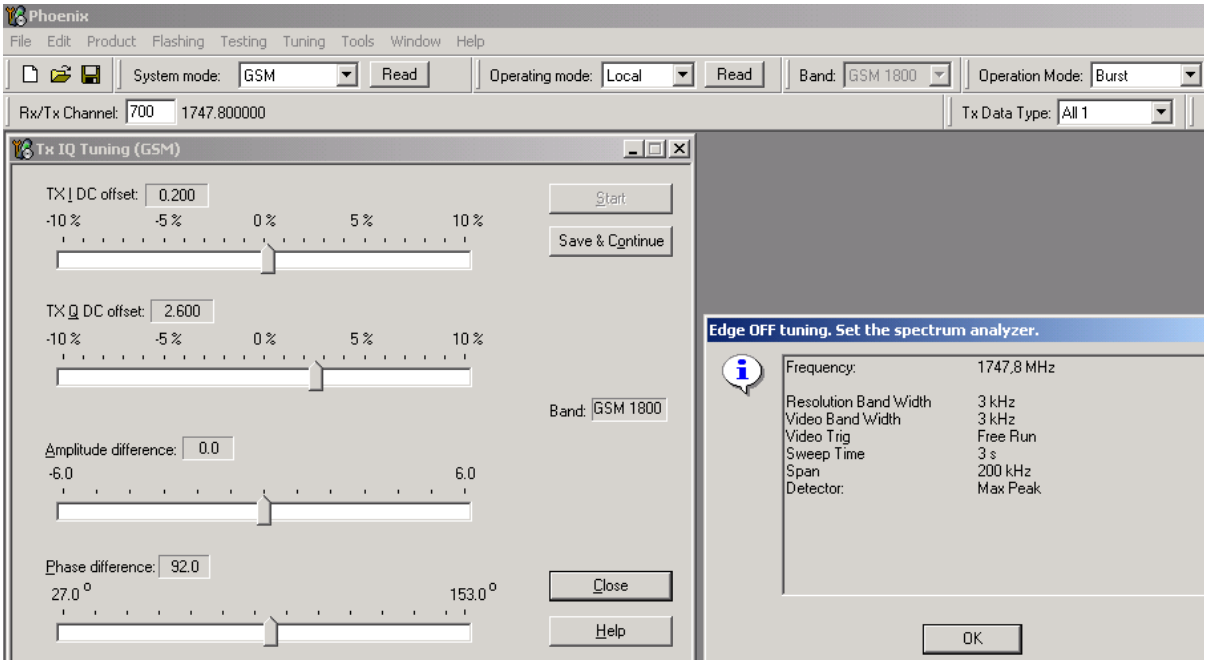
- Tune LO leakage to minimum with TXI/TXQ DC offset control (f0 on spectrum analyser screen)
- Tune unwanted sideband (fo + 67kHz) to minimum using Amplitude/Phase difference controls



Typical TX IQ Tuning Values and tuning limits GSM 900:

Parameter	Typ. Value	Low Limit	High Limit
I DC Offset	-2.5...+0.5	-6	+6
Q DC Offset	-2.5...+0.5	-6	+6
Amplitude difference	-0.2...+0.2	-1	+1
Phase difference	88.0°....92.0°	80°	100°

- If values shown are within limits, check the “Save & Continue” to save the new values to the product



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- Continue tuning from GSM1800
- Set spectrum analyser to the settings on the screen
- Repeat the same steps as for the EGSM900 band

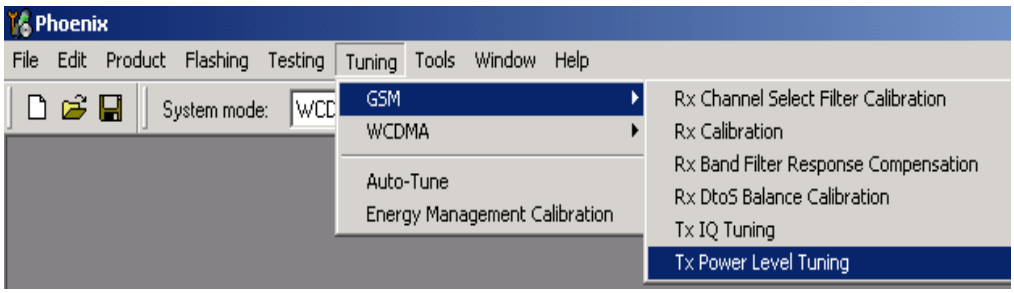
Typical TX IQ Tuning Values and tuning limits GSM1800:

Parameter	Typ. Value	Low Limit	High Limit
I DC Offset	-3.0...0.0	-6	+6
Q DC Offset	-1.5...+1.0	-6	+6
Amplitude difference	-0.5...+0.0	-1	+1
Phase difference	90.0°...97.0°	80°	100°

- If values shown are within limits, select the "Save & Continue" to save the new values to the product
- Close the "TX I/Q Tuning" – dialog to end tuning

TX Power Level Tuning

- Vector Signal Analyser (or spectrum analyser) needed
- With Tx Power Level Tuning, the coefficients are adjusted for each power level
- Must be done separately on both bands!
- Start Power Level tuning at EGSM (GSM900) Edge OFF band, then continue for GSM1800 Edge OFF band
- In EGSM900 band the power level tuning is made for both high and low PA Modes
- In GSM1800 band only for high PA mode
- Remember to take jig and cable attenuations into account!



- Tuning > GSM > Tx power level tuning

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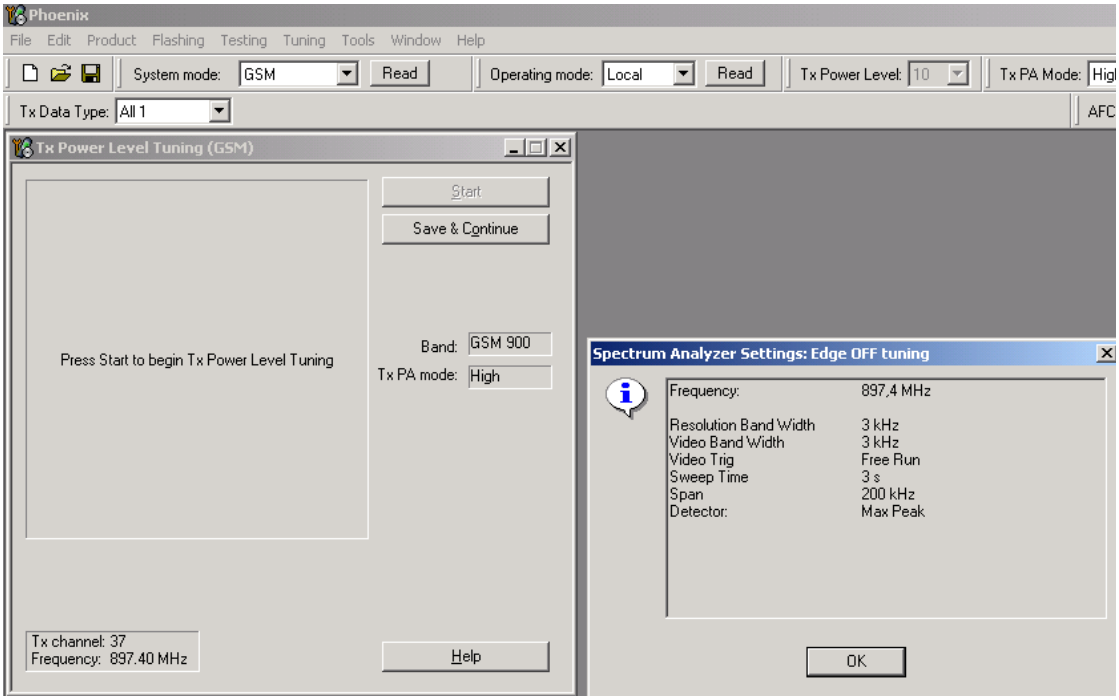

- Select "Start"

Note: the PA Mode is "High" at this point

- The coefficient table lists the power level, coefficient, target dBm value for each power level
- The tuned power level can be chosen by using up and down arrows or mouse.
- The current power level is shown with inverse colours
- The tuning value can be adjusted with "-" and "+" keys
- Tune base level and power levels 19, 15 and 5 to target level

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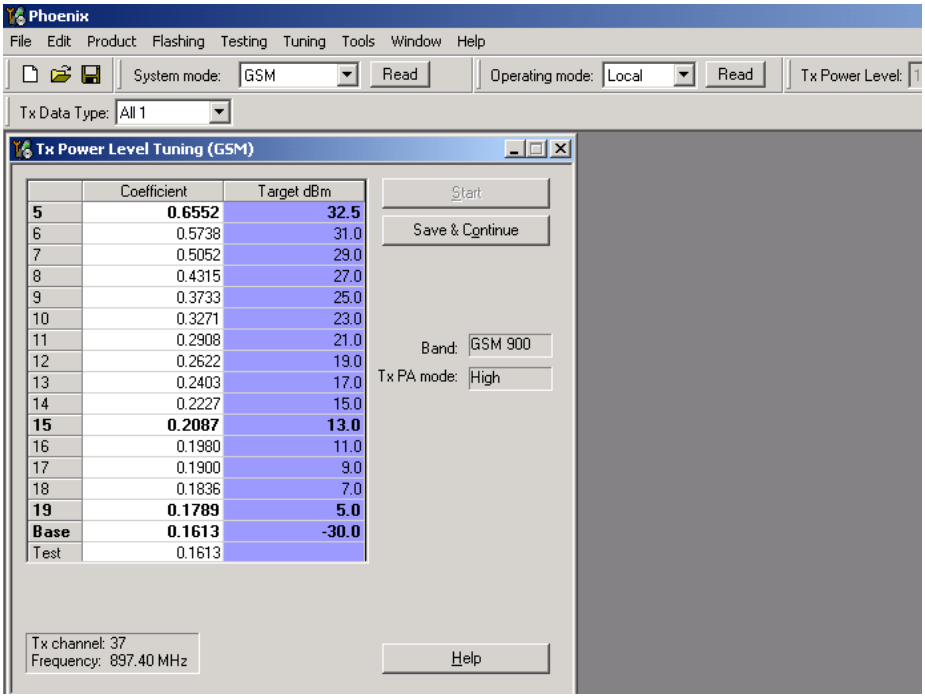
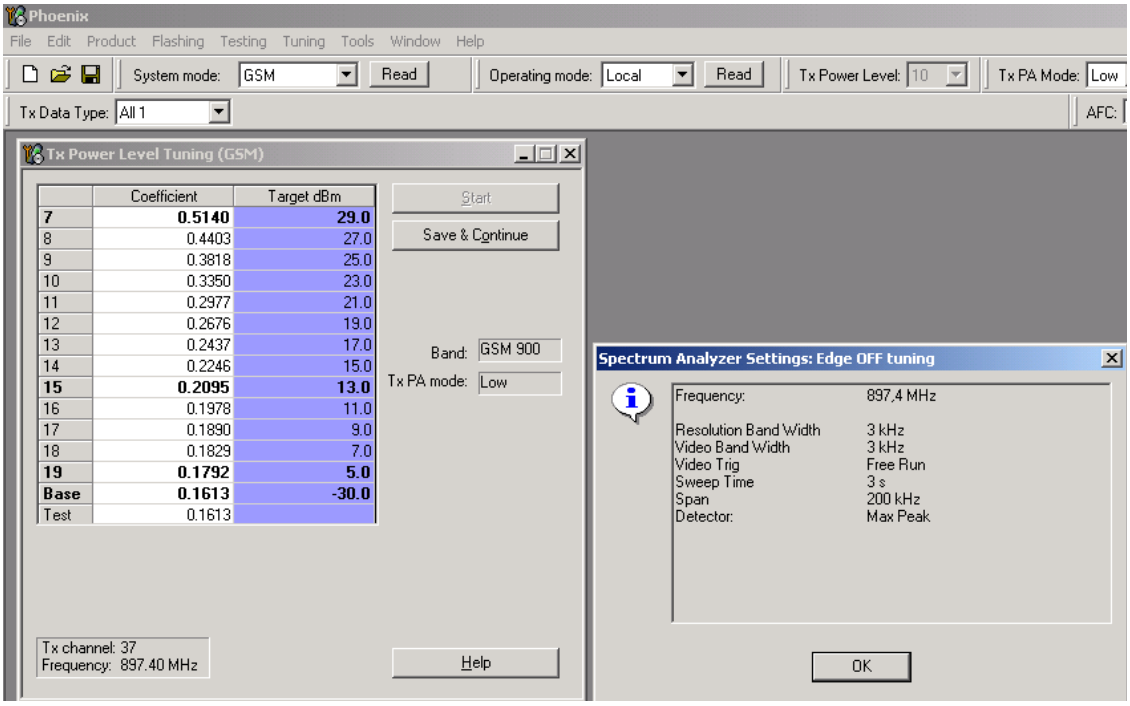


- Press "Save & Continue"



- The TxPA Mode has changed to "Low"
- Tune power levels 19, 15 and 7 (Levels 5 & 6 are not used, base level tuning not required)

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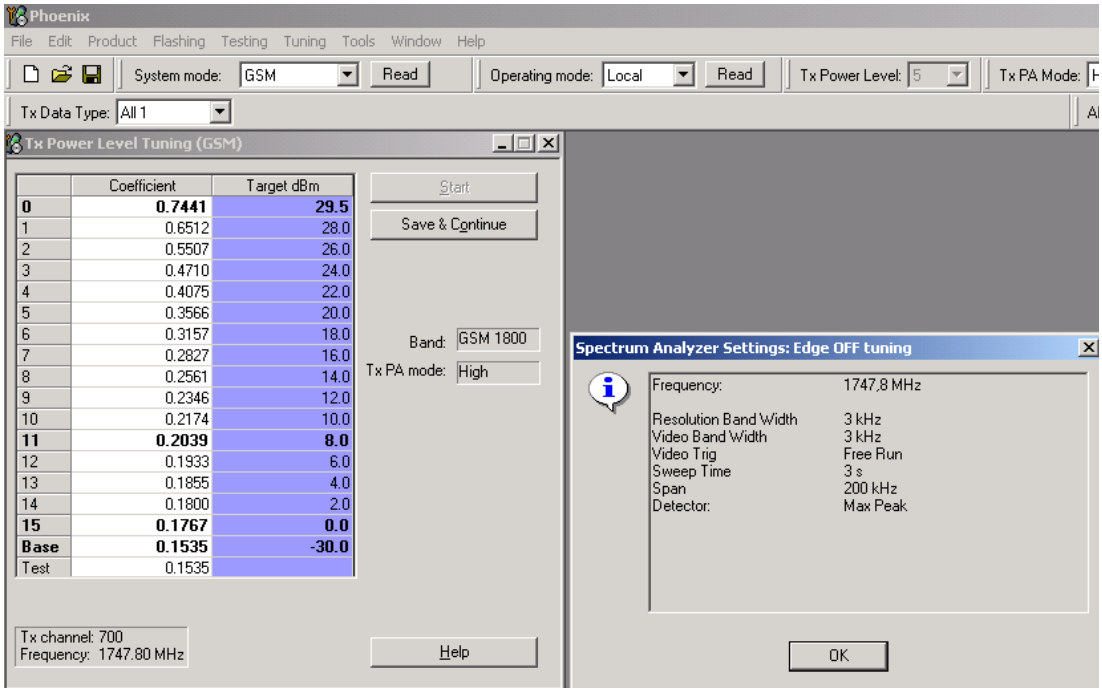
Typical values: EGSM900

Power level	PA high mode	PA low mode
5	700	-
7	520	-
15	211	213
19	180	180
Base	163	163

- Select "Save & Continue" to save values to phone permanent memory



- Continue tuning for GSM1800 Edge OFF band.
- Repeat the same steps as for the EGSM900 band above

Note: that In GSM1800 band tuning is only made in "High" mode

Typical values: GSM1800

Power level	PA high mode
0	748
11	192
15	169
Base	150

- Select "Save & Continue" to save values to phone permanent memory
- Close the "TX Power Level Tuning" – dialog to end tuning

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WDCMA Tuning

The following contains information about Rf tunings with Phoenix software. Also there is information about WCDMA RF controls and tests run with this software.

WCDMA RF Tunings

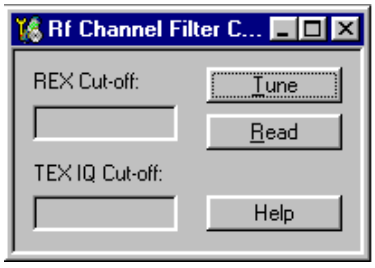
- Order for WCDMA RF tunings:
  - RX/TX channel filter calibration
  - Temperature sensor calibration
  - RX AGC tuning
  - RX band response
  - TX bias current setting
  - TX AGC tuning
  - TX power detector tuning
  - TX band response
- To run these with Phoenix SW, the phone must be in local mode with "WCDMA" system selected.

Note: When WCDMA tuning has finished the system selected must be changed back to dual mode otherwise the customer won't be able to register with a gsm network.

WCDMA RF Channel Filter Calibration

- This does not require any external instruments.
- Run this component from the Phoenix menu:

  Tunings/WCDMA/RF channel filter calibration.



- This is the initial view. Press "Tune" to start calibration.

Note: You can also read values from memory with "Read".

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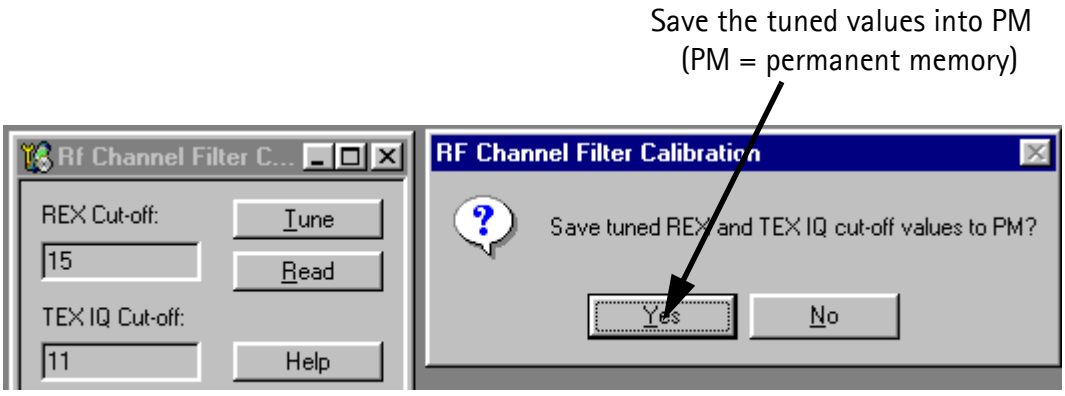
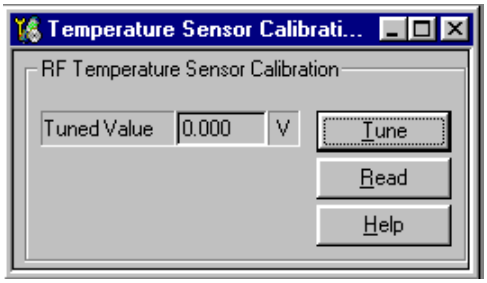


The tuned values are settings for the baseband analog active low pass filters in REX and TEX ASICs.

WCDMA Temperature Sensor Calibration

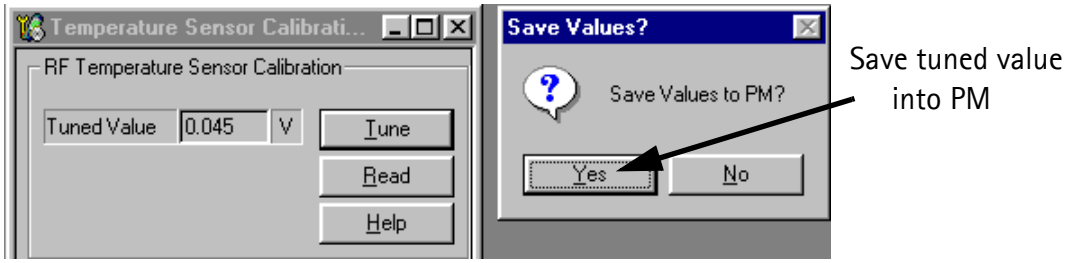
- This does not require any external instruments.
- The phone must be at room temperature for this calibration.
- Run this component from the Phoenix menu:

  Tunings/WCDMA/Temperature sensor calibration.



- This is the initial view. Press "Tune" to run the calibration.

Note: By pressing "Read", the saved value can be read from PM



The value stored is a DC-voltage from the temperatur sensor in TEX. It's value is the difference between the expected value for room temperature so it can be either +.

WCDMA RX AGC Alignment

- A signal generator is needed to provide a test signal into the WCDMA RF test connector.
- Calibration is started from the Phoenix menu:

  Tunings/WCDMA/RX AGC Alignment

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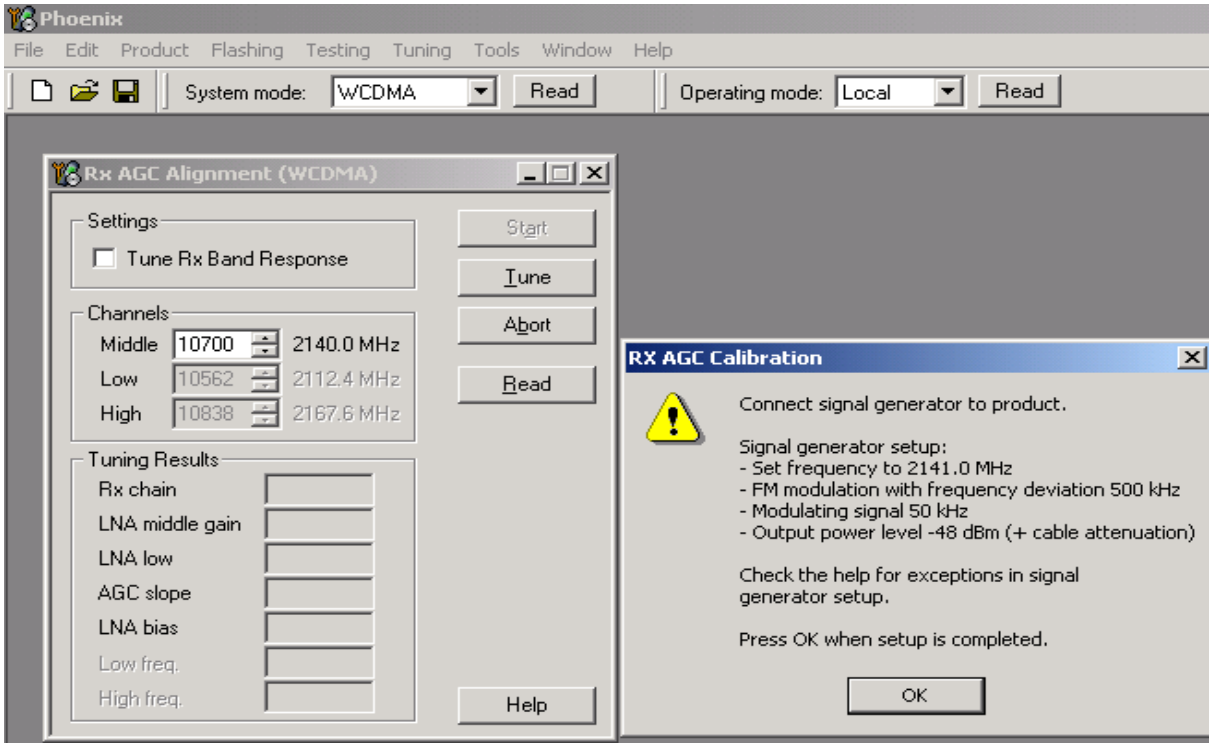
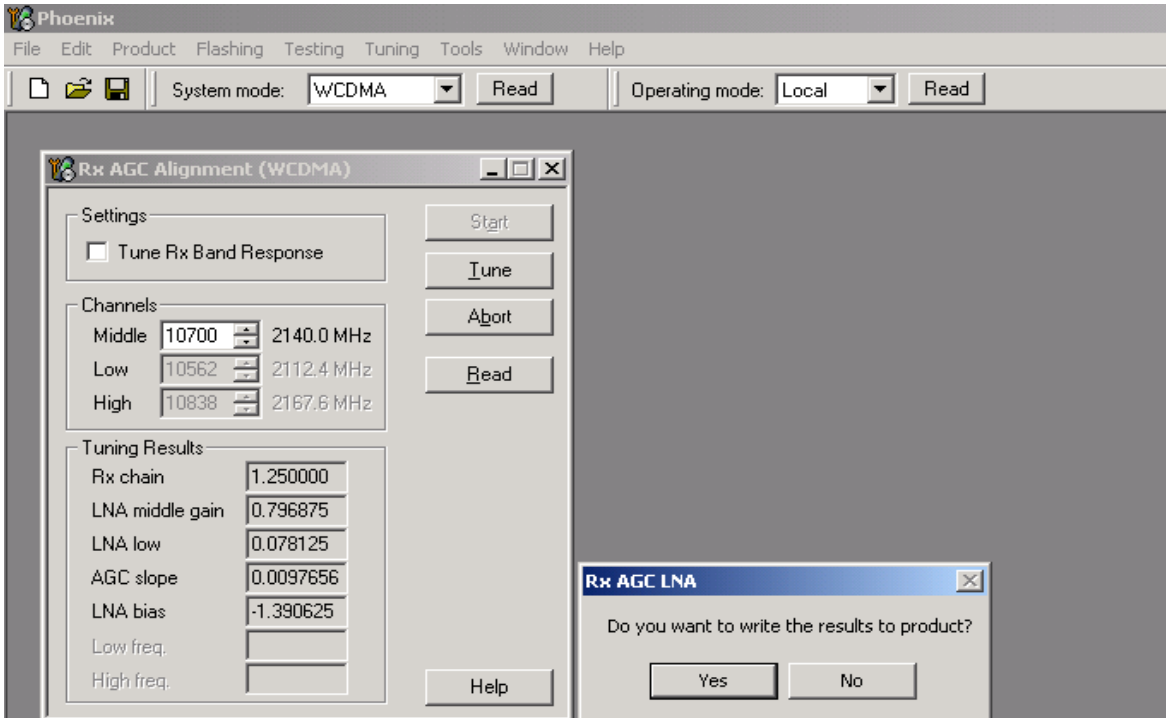


- Press "Start" then "Tune".
- The calibration routine will define the signal generator settings for you.
- When you have applied the test signal - click "OK".



- The calibration values are then calculated and stored into PM.

Note: With the "Read" - button you can check the values stored in PM.

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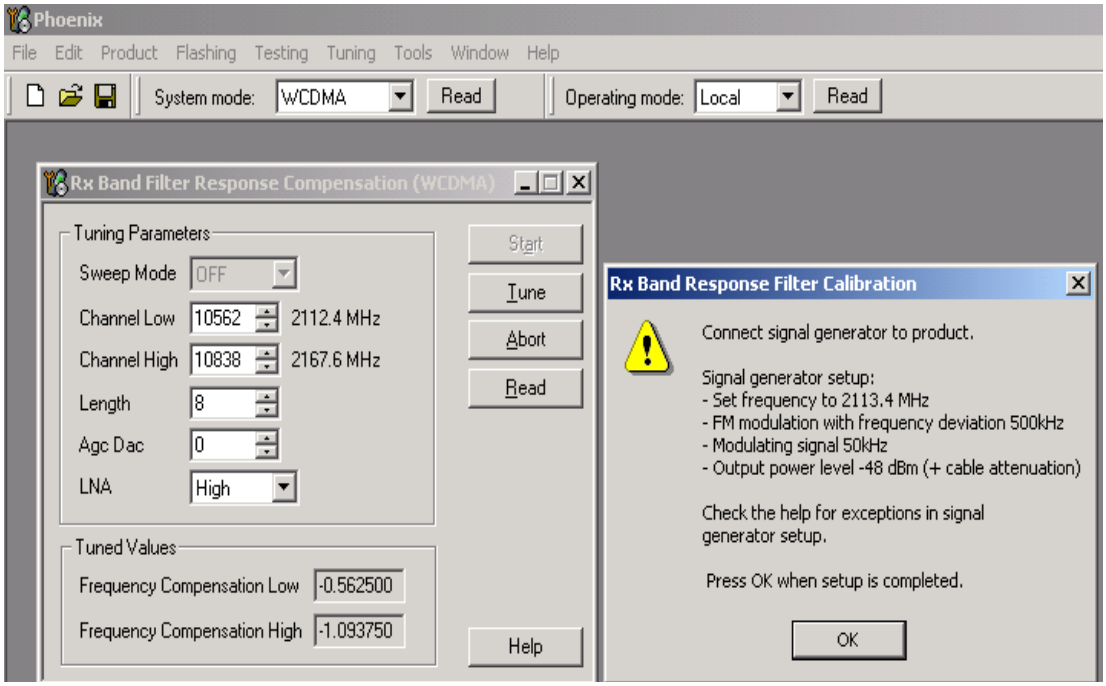
Definitions of the parameters saved are:

RX chain gain:	This is the overall receiver gain error compared to expected value in dB's.
LNA mid gain error:	This is the difference in LNA's gain step compared to expected value in dB's.
LNA low gain error:	This is the difference in LNA's gain step compared to expected value in dB's.
AGC slope error:	This is the gain slope error in the baseband analog AGC gain stages.
LNA bias error:	This is the difference in the LNA maximum gain with full and half bias current.

WCDMA RX Band Response Calibration

- A signal generator is needed and test signal applied into NMM-3's RF test connector.
- Calibration is started from the Phoenix menu:

  Tunings/WCDMA/RX band response calibration



- Press "Start" then "Tune".
- The calibration routine will define the signal generator settings for you.
- Set frequency and settings to defined values and allow the tuning to continue by pressing "OK".

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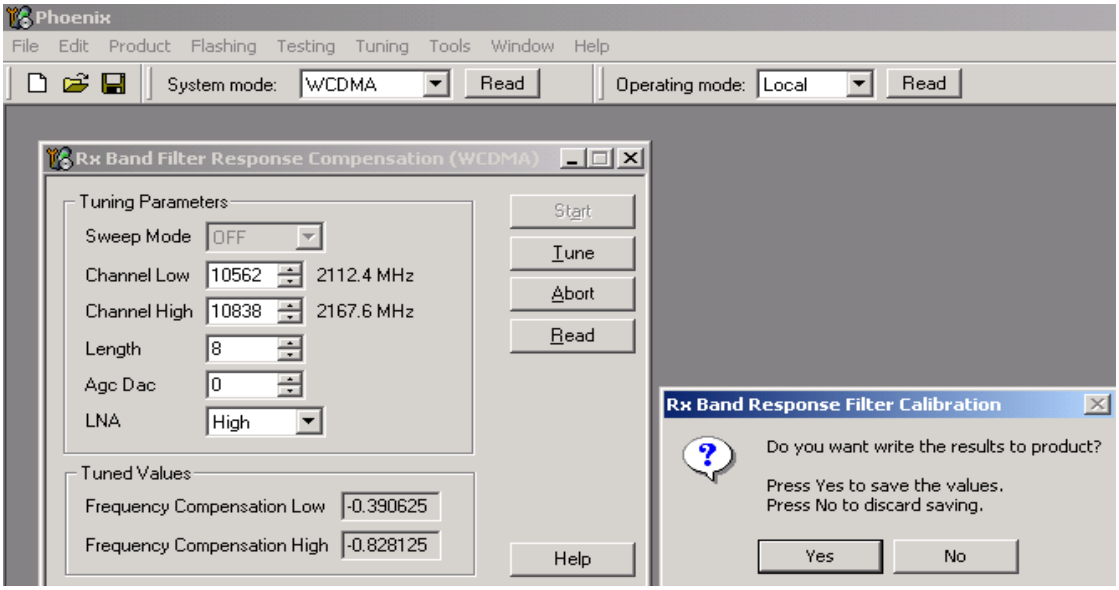


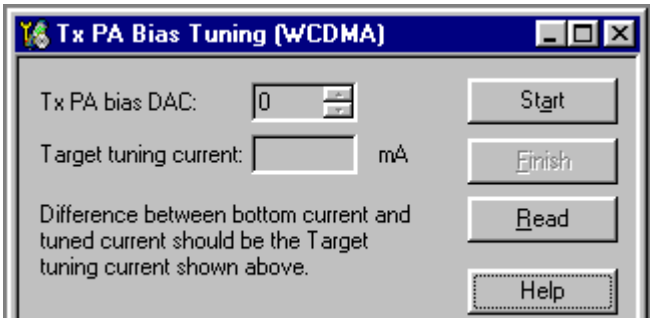
- After this low and high frequency compensation values for RX band response will be stored into PM when you press "Yes" to save changes.

Note: With the "Read" - button you can check the values stored in PM.

WCDMA TX PA Bias Tuning

- With this tuning the power supply to the phone must be set to 3.6V.
- Calibration is started from the Phoenix menu:

  Tunings/WCDMA/TX PA bias tuning


Tx PA Bias Tuning (WCDMA)
Tx PA bias DAC: 0
Target tuning current: mA
Difference between bottom current and tuned current should be the Target tuning current shown above.
Start
Finish
Read
Help

- Press "Start" .
- After pressing the "OK" button read the lowest current consumption from current meter (of the phone). Increase the PA Bias DAC value with the arrow buttons until the tuned current has increased by the 25mA target.

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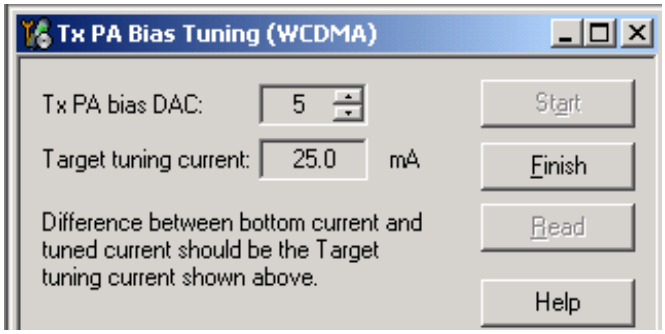


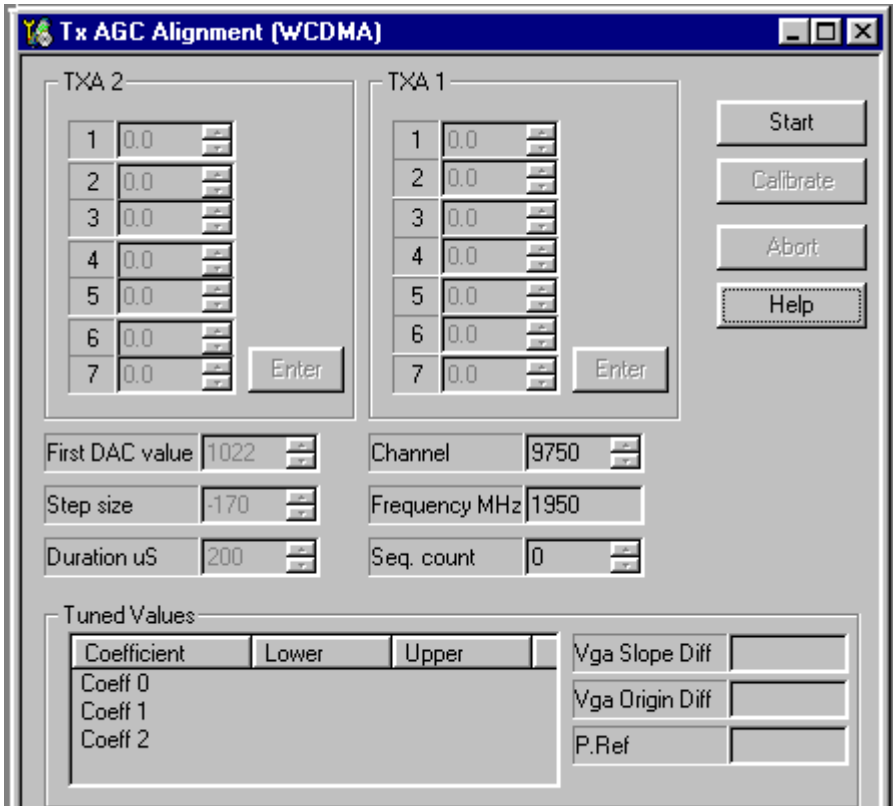
- Press “Finish”, and save the tuning value for PA bias

The tuning value sets the IPA1 current output from UEM that determines the bias current of the second stage of the WCDMA PA.

WCDMA TX AGC Alignment

- This alignment requires the use of a vector signal analyser or spectrum analyser.
- Calibration is started from the Phoenix menu:

  Tunings/WCDMA/TX AGC alignment



- Press “Start” .
- The program asks do you want to read PM values or use current values or defaults. When running for the first time use defaults. Press “OK”.
- Connect the analyser into the WCDMA RF test connector

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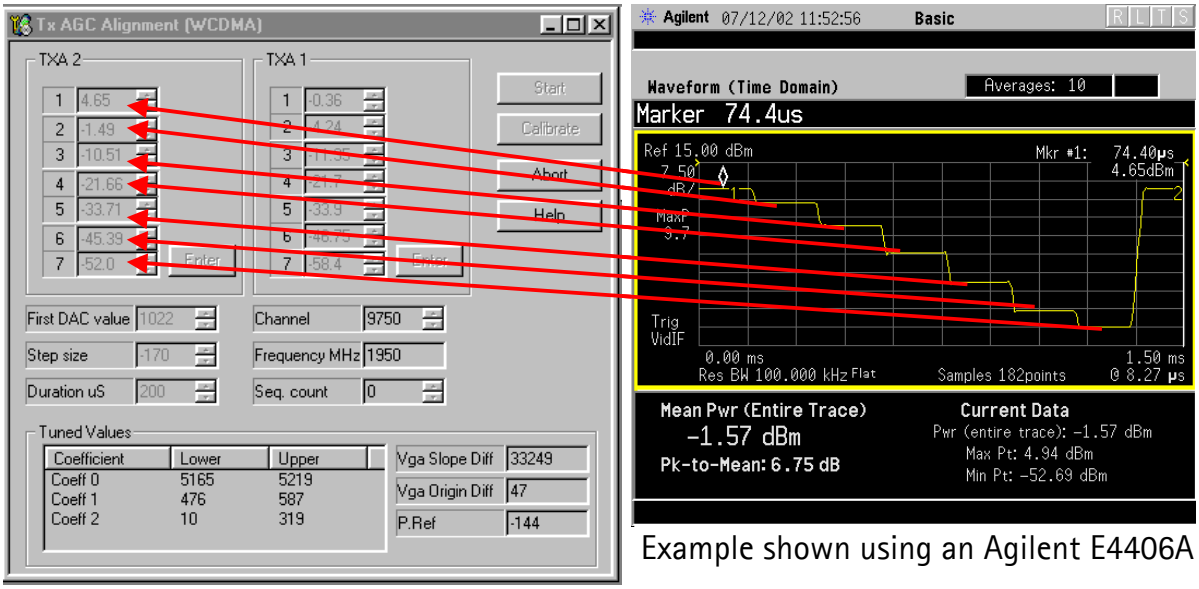
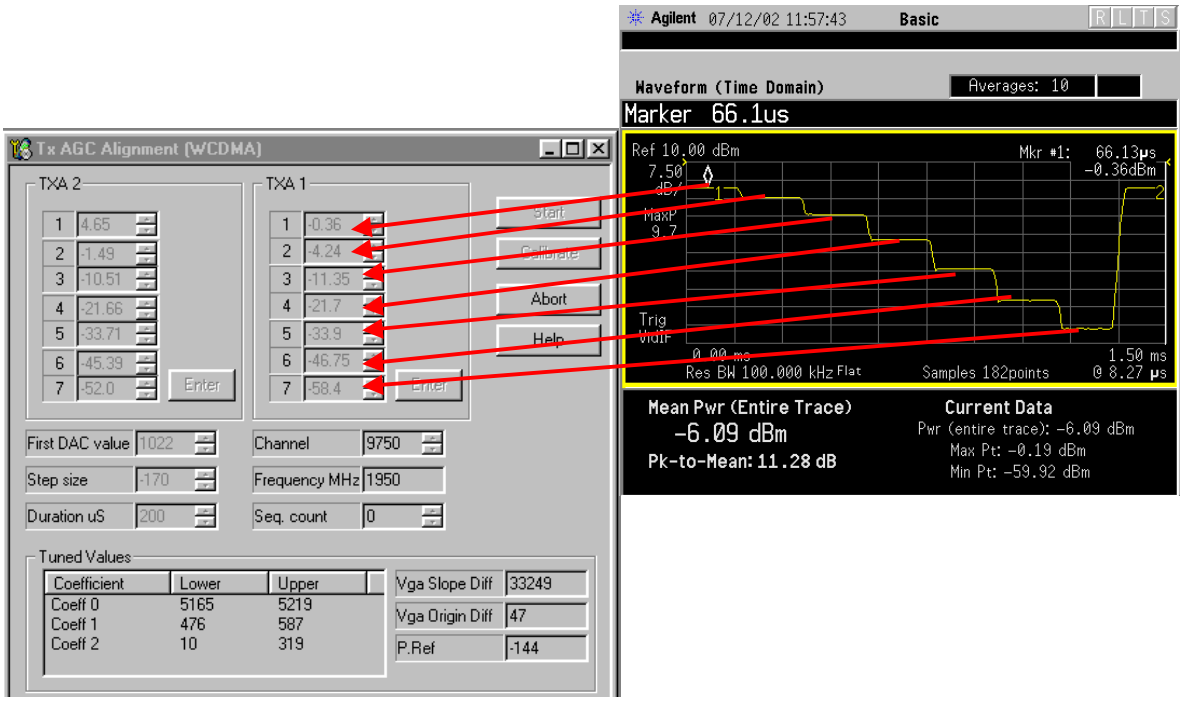
- The phone will send a power ramp sequence at 1950Mhz at 7 different power levels. The actual signal is at 1950.3MHz, since the transmitter is modulated with a 300kHz IQ-sinewave.
- Set the analyser to 1950.3MHz 100kHz RBW, sweeptime 2.0 ms, video triggering used with trace averaging. Set the ref. level first to +25 dBm, then decrease it to get a more accurate reading when taking a measurement.



Example shown using an Agilent E4406A

- Read power levels for slots from ramp into TXA 2 table and press “Enter” to run the ramp for 2nd AGC-stage.



- Fill the power levels from the 2nd ramp into TXA 1 table and press “Enter”.

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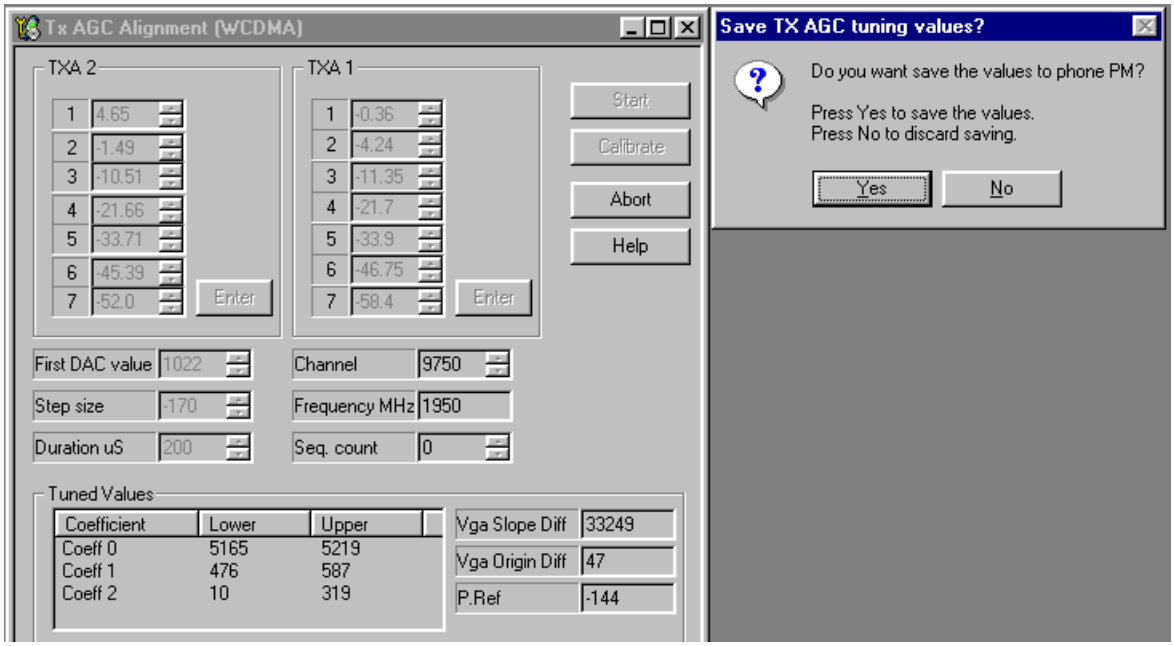
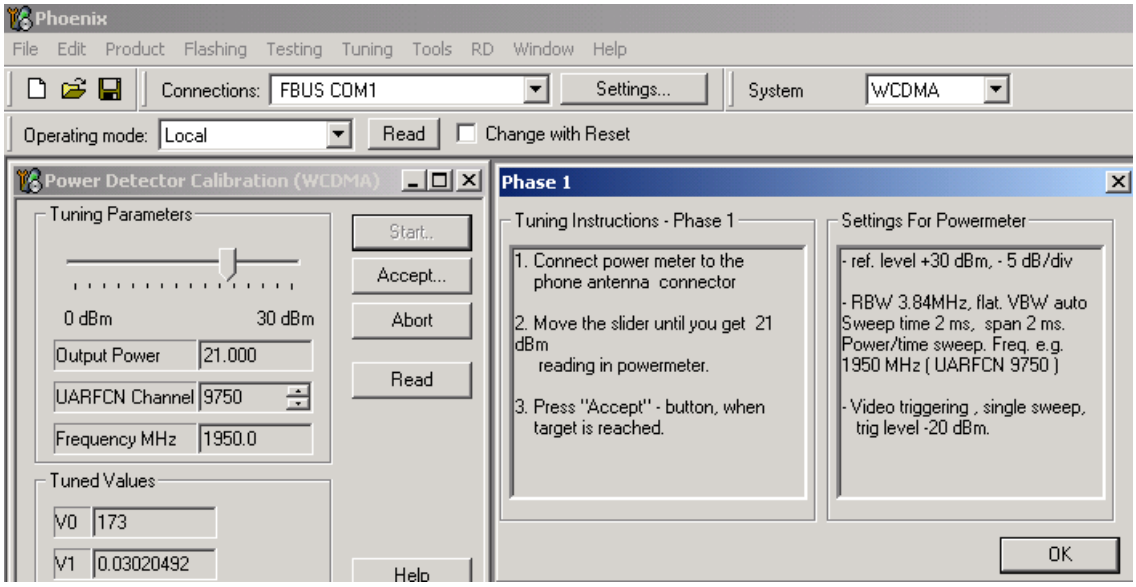


- After filling in the measured power levels for both AGC-stages (TXA1 for TEX and TXA2 for HEX), Phoenix calculates a set of coefficients and parameters to build a model for TX AGC behaviour. Store them into PM.

WCDMA TX Power Detector Calibration

- This alignment requires the use of a power meter ("thermal" sensor) or vector signal analyser. The wideband mean power should be measured in a 3.84MHz RBW.
- Calibration is started from the Phoenix menu:

  Tunings/WCDMA/Power detector calibration



- Press "Start" .

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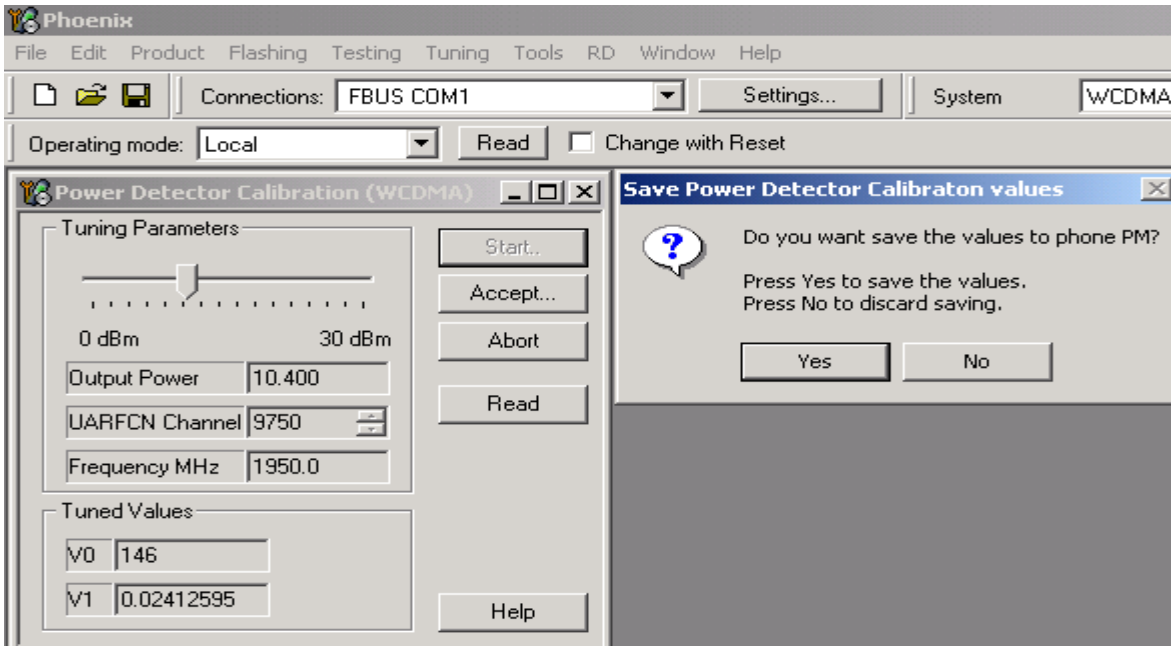
- Tune the output power with the slider to +21 dBm. The power can be set with either the slider or the arrow keys on the keyboard. Press "Accept"



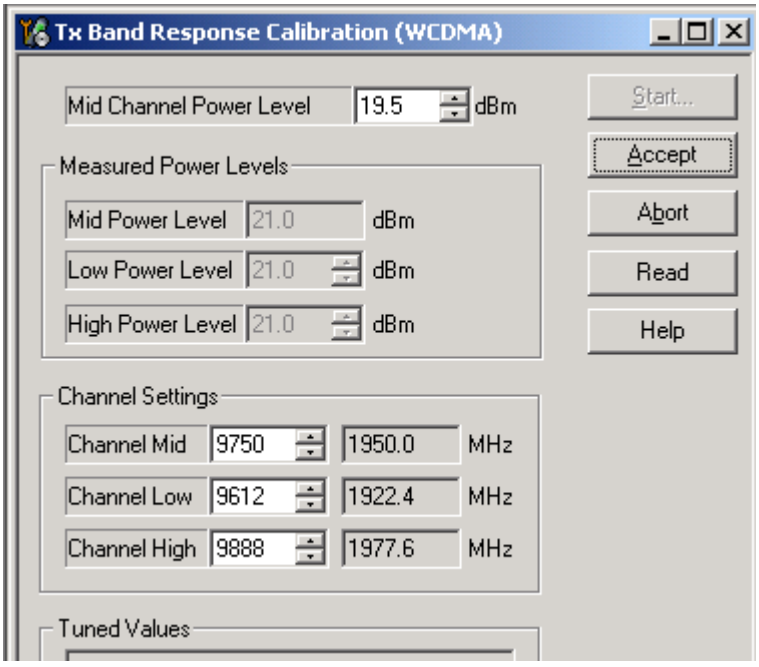
- In the 2nd phase, the output power is tuned to +11 dBm.
- Press "Accept". The tuned coefficients V0 and V1 are calculated.

Note: With the "Read" - button you can check the values stored in PM.

WCDMA TX Band Response Calibration

- This alignment requires the use of a power meter ("thermal" sensor) or vector signal analyser.
- Calibration is started from the Phoenix menu:

  Tunings/WCDMA/TX Band Response Calibration



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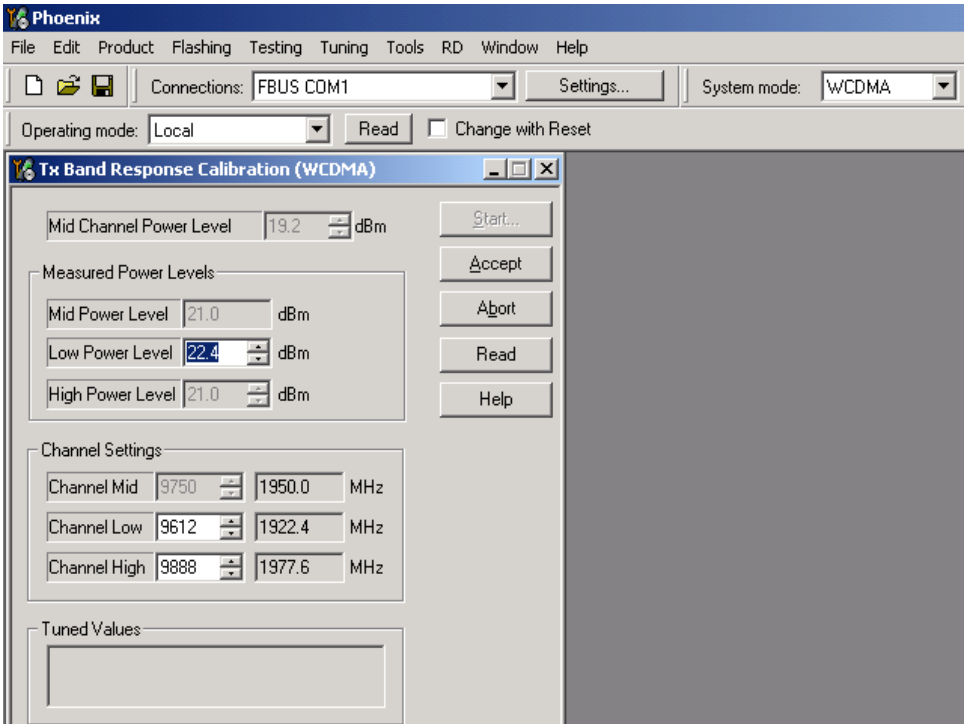
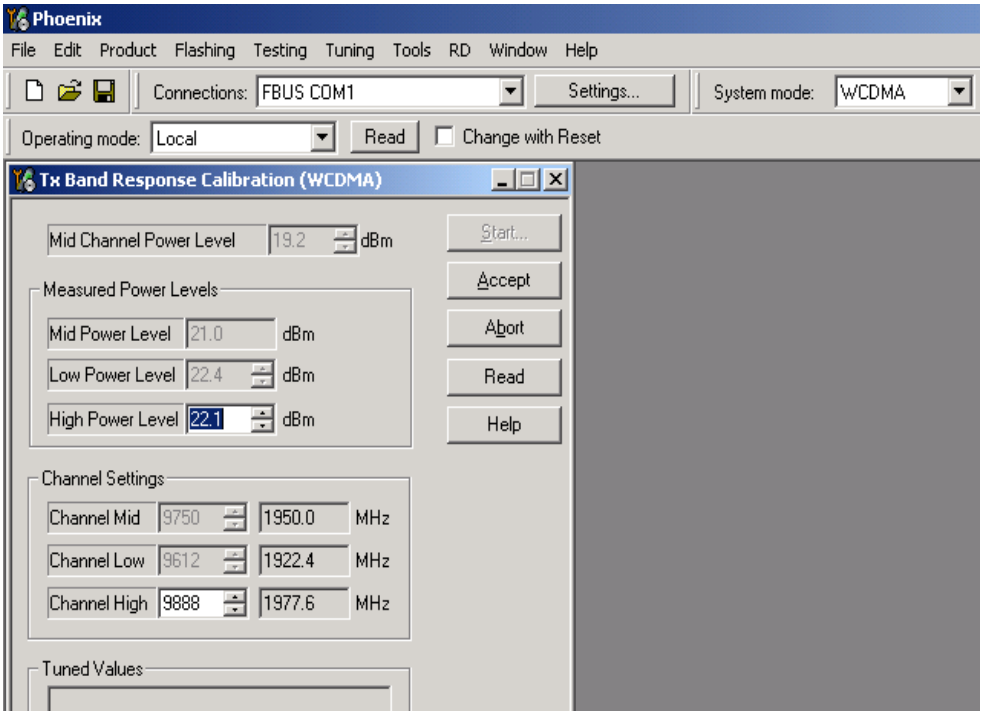
Press "Start"

Tune the power at mid channel using the spin button to get a reading of 21 dBm on the tester. Press the "Accept" button.

Note: With the "Read" - button you can check the values stored in PM.



- Change tester to low channel
- Read value from tester and enter it to Low Power Level Field. Press the "Accept" button



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- Change tester to high channel
- Read value from tester and enter it to High Power Level Field. Press the Accept" button.
- Save values to PM when complete.

WCDMA RF Testing Using Local Mode

Phoenix supports the following functions in local mode:

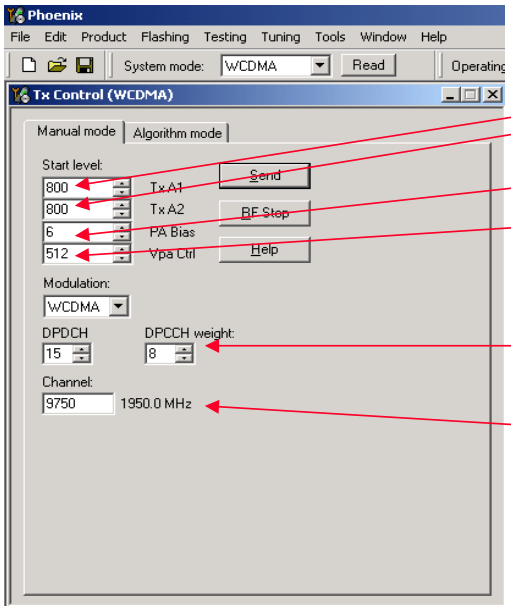
- TX control using either direct power control or uplink power control
- RX control to LNA and BB AGC. Algorithm Mode supports the RSSI measurements

WCDMA TX Control

- Two modes are available:
  - Manual mode is for direct control of the AGC's, PA Bias - and DC/DC-converters. Also, modulation type, channel settings and different kinds of sweeps with DACs can be run to study the phones behaviour
  - Algorithm mode can be used when TX (AGC's) are calibrated. Output power can be set to fixed power levels or power sweeps can be run. Also WCDMA signal code settings (scrambling and channelisation codes can be modified).
- WCDMA TX control can be activated from Phoenix-menu:

  Testing/WCDMA/Tx Control

- Manual mode:



DA-converter setting for AGC's in TEX and HEX (0...1023)

DA-converter for PA bias control (0...12)

DA-converter setting for DC/DC-converter (112 ... 512; 112 DAC~1.5 V DC/DC output voltage, 512 DAC ~3.3V)

Modulation selection is for WCDMA Signal or CW Signal

Here the uplink data- and control channel weighting can be adjusted (0...15)

Uplink channel number can be changed in here (9612 ... 9888).

NOTE: When settings are done, they're enabled after pressing "Send". If settings are then changed (e.g. new channel number) you must press "Stop" and "Send" again.

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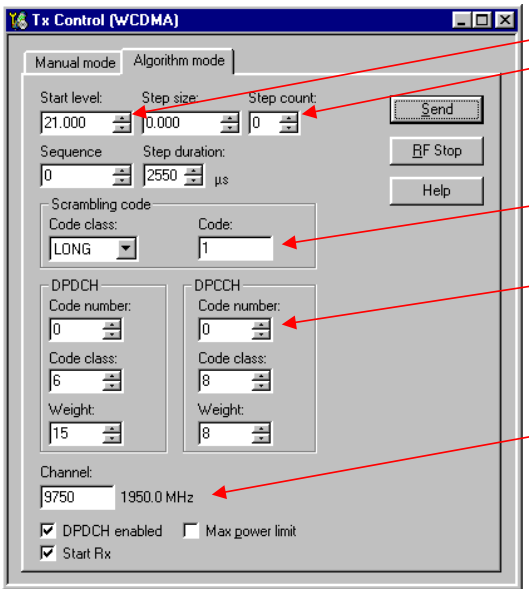
- Algorithm mode:



Uplink power level (open loop power), (-57 ... +21 dBm)

Step size (in dB's + or -) and step counts for power sweeps.

Sequence is for how many sweeps wanted

Step duration is the length of the step in us (max 2550 us)

Uplink scrambling code and type can be selected here

Here the uplink data- and control channelization code numbers and weighting can be adjusted (0...15). Code classes for those define the bit rates (spreading factors). e.g. DPDCH code class 6 stands for spreading factor 60 and 8 in DPCCH is for SF 256. These SF's are used in 12.2.kpbs uplink voice channel.

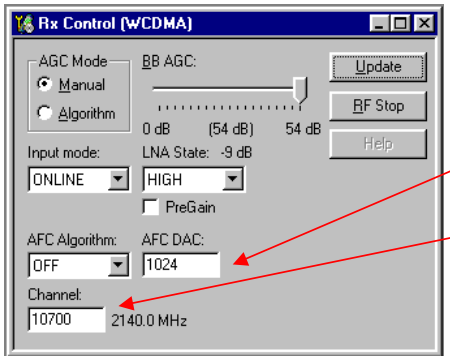
Uplink channel number can be changed in here (9612 ... 9888).

NOTE: When settings are done, they're enabled after pressing "Send". If settings are then changed (e.g. new channel number) you must press "Stop" and "Send" again.

WCDMA RX Control

- Two modes are available: Manual or algorithm.
- WCDMA RX control can be activated from Phoenix-menu

  Testing/WCDMA/Rx Control



In manual mode the LNA with 3 different gain steps and BB AGC can be controlled.

AFC DA-converter can be adjusted (0... 2047, 1024 middle value). NOTE: If TX control is activated the AFC control can be done from here.

Channel number for downlink can be set here (10562 ... 10838)

RX control can be activated by pressing "Update". Again if changes are made into settings, they are valid after pressing "RF Stop" then "Update"

NOTE: "RF Stop" also disables TX control if that was active !

- Received signal power measurements are possible with the algorithm mode in Rx control.
- Rx power measurements can be activated from Phoenix-menu:

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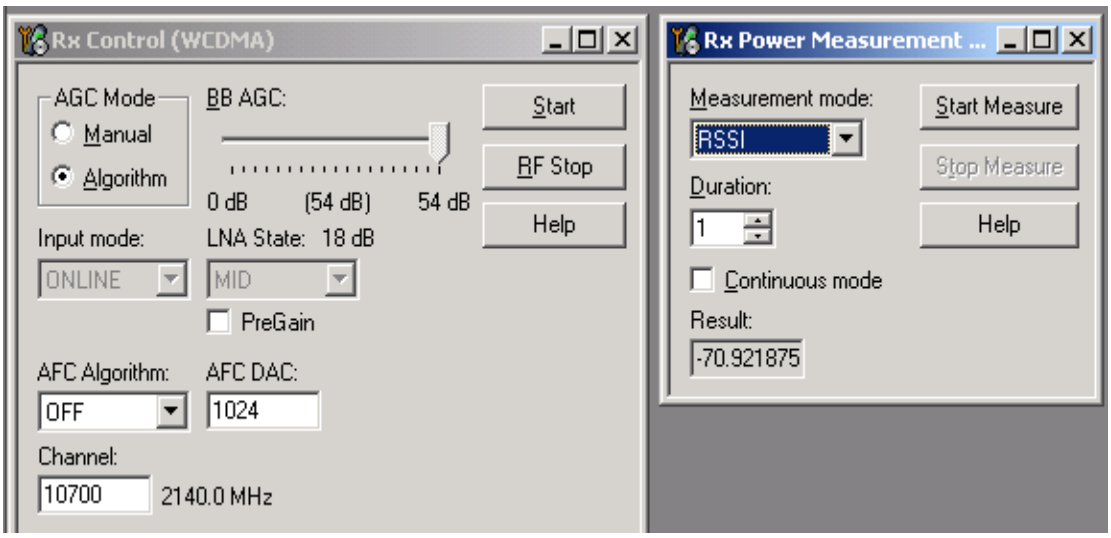
Testin/WCDMA/Rx Power Measurement



Example of an RSSI measurement.

Feed a CW or WCDMA modulated signal from a generator into the antenna connector and set "AGC Mode" to algorithm in the Rx control window. Press "Start".

Select RSSI in measurement mode.

Press "Start Measure"

The result should be in dBm.

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